1961 Volume 18, Number 11

PREVENTION OF DETERIORATION

ABSTRACTS

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Prevention of Deterioration Center

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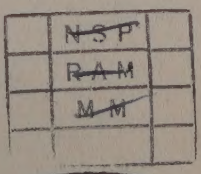

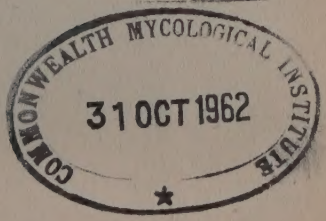

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Hannan, P. J. (U. S. Naval Research Laboratory)
ELECTROPHORETIC PROPERTIES OF SPORES OF ASPERGILLUS NIGER
Applied Microbiol. 9:113-117 (March 1961)

Examination of spores of Aspergillus niger by the microelectrophoresis technique shows that the predominant characteristic of the surface is that of a polysaccharide, probably a starch since the mobility of the spores changes after treatment with Taka-Diastase, a starch-hydrolyzing enzyme. The surface also appears to contain an acid group which is readily neutralized and a group which is easily hydrolyzed by dilute alkali. The effects on spore mobility of treatment with mercurials, alkali or acid, and of freezing are described.

Aspergillus, physiology

PDL-39338

Tatarenko, E. S., and I. P. Ternikova
DEVELOPMENT OF MOULD FUNGI IN DISTILLED WATER (in Russian)
Nauch. Doklady Vysshei Shkoly, Biol. Naukio No. 2:91-95 (1960)

Various strains of Aspergillus oryzae, A. niger, Penicillium chrysogenum, and other mold species, such as Fusarium moniliforme, Trichothecium roseum, Trichoderma lignorum, Rhizopus nigricans, Mucor racemosus, Stemphyllium ilicis, S. botryosum, S. alternariae, and two Alternaria species were grown first on diluted Czapek's malt medium, then in a medium containing only the mineral components of Czapek's medium, then in tap water, and finally in redistilled water.

Most fungi, and particularly strains of A. oryzae, grew well in the mineral medium. In tap water, the growth was poor and some morphological changes were observed. All containers for redistilled water, in-

cluding culture test tubes and cover slips for moist-chamber cultures, were thoroughly cleaned to remove traces of organic matter. Drops of redistilled water on cover slips were inoculated with single spores; tubes containing 0.5 ml redistilled water, with a few spores. In many instances the spores in the moist chamber germinated, grew short hyphae, then disintegrated. A certain percentage of these spores developed (10% for Mucor to nearly 100% for some strains of A. oryzae), forming mycelia, conidiophores, and viable conidia which sometimes germinated in the redistilled water medium. Although growth was poor as compared with the growth in nutrient media, morphology modified, and number of conidia small, the organisms developing in redistilled water could be considered normal. When transferred to a nutrient medium, they grew into colonies having a normal morphology and a normal reproductive cycle. In cultures of A. niger, crystals were seen in or on the mycelium. In Fusarium moniliforme cultures fat droplets, stainable with Sudan III, accumulated. Pigments were never observed in redistilled water. In test tubes with redistilled water, the relative abundance of growth varied with the mold species or strain. Some strains of A. oryzae, Fusarium moniliforme, Trichothecium roseum, Alternaria tenius, and Stemphyllium species showed the best growth.

The character of growth in redistilled water, the quantity of mycelium formed, and the viability of the spores suggest a more abundant supply of organic nutrients than the small quantities of organic matter contained in air.

Fungi, Aspergillus, Penicillium, Fusarium, Mucor, Stemphyllium, Rhizopus, Trichoderma, growth, water, foreign

1961 Biol 69
Vol.18 PDL-39441

Gams, Walter (Bodenbiologisches Institut der Forstlichen Bundes-Versuchsanstalt, Mariabrunn, Austria)
ISOLATION OF HYPHAE FROM THE SOIL (in German with English summary)
Sydowia 13(1-6):87-94 (1959)

Thin nylon strips, 1 mm wide, are affixed to microscopic slides with tape, sterilized in alcohol and buried in soil for 1 wk. The slides are then removed, rinsed and the strips are plated on nutrient agar with aureomycin. Hyphae visible on microscopic examination over 3 to 4 days are marked on the glass plate with ink. Colonies developing in one or two days can be easily isolated and plated. The substitution of cellophane for nylon makes possible isolation of cellulolytic fungi.

Fungi, soil, isolation, foreign

PDL-40252

Fields, M.L., G. R. Ammerman, and N. W. Desrosier
GROWTH OF ASPERGILLUS ORYZAE IN IRRADIATED SUCROSE-NITRATE MEDIUM
Applied Microbiol. 9:110-112 (March 1961)

Fungi, Aspergillus, growth, culture, radiation, high energy

PDL-40228

Miles Chemical Co. Elkhart, Ind.
TAKAMINE CELLULASE 4000
6 p.
Aspergillus, fungi, enzyme, cellulolysis, uses, chemical properties

1961 Biol 70
Vol.18 PDL-39168

Tatarenko, E. S.
PARASITISM OF MOULD FUNGI (in Russian)
Doklady Akad. Nauk S.S.S.R. 124:220-222 (January 1959)

A description is given of the phenomena of antagonism and parasitism among various species and strains of Aspergillus and Penicillium. Antogonism was observed when pairs of molds, such as A. oryzae and P. rugulosum, P. cyaneo-fulvum and P. rugulosum, P. chrysogeum and P. rugulosum, were grown together in Petri dishes. In some cases, when the conidia of an antagonist were transferred to the hyphae of the antagonized mold, they started growing on the latter, behaving as parasites. Interspecies and interstrain parasitism, and even parasitism within a single population, were observed in nineteen of the thirty-five species and strains tested. The parasite usually attacked the conidia-bearing hyphae of the host, occasionally its aerial mycelium. Parasitism within single populations (grown from single spores) in several strains of A. oryzae and A. niger manifested itself by the penetration of conidiophores by secondary mycelia or by the formation of thin hyphae inside the large ones. In most instances, the parasites attacked their hosts when the latter were in the final stage of conidia formation. It is suggested that the phenomenon of parasitism within a single population, such as observed in Aspergilli, can be the cause of the great variability of these microorganisms.

Fungi, Aspergillus, Penicillium, biocoenosis, foreign

PDL-40219

Walters, N.E.M. (Australia. Commonwealth Scientific and Industrial Research Organization. Division of Forest Products)
PORIA HEALEYI SP. NOV. THE CAUSAL FUNGUS OF YELLOW STRAW ROT IN JARRAH (EUCALYPTUS MARGINATA SM.)
Brit. Mycol. Soc., Trans. 41:95-98 (1958)

Fungi, Poria, physiology, wood, Eucalyptus

Deterioration
NRC

1961 Biol 71
Vol.18 PDL-40236

Marr, Eleanor K., and Robert W. Stone (Pennsylvania State University)
BACTERIAL OXIDATION OF BENZENE
J. Bacteriol. 81:425-430 (March 1961)

Two organisms, a strain of Pseudomonas sp. and one of a Mycobacterium sp. capable of oxidizing benzene as a sole carbon source, were isolated from soil by an enrichment culture technique. Both organisms oxidized benzene manometrically, with sufficient oxygen uptake to account for oxidation to carbon dioxide and water. With cells of the Pseudomonas sp. grown on benzene, nearly 90% oxidation occurred. The rate for Mycobacterium sp. was somewhat lower on most substrates used. A metabolic pathway for the breakdown of benzene, via 3,5-cyclohexadiene-1,2-diol and catechol is proposed. Phenol and o-benzoquinone are not probable intermediates in the oxidation process.

Bacteria, benzene, physiology

PDL-39992

Cooke, Wm. Bridge, and H. T. Fournelle
SOME SOIL FUNGI FROM AN ALASKAN TUNDRA AREA
Arctic 13:266-270 (December 1960)

Fungi, soil, identification, Alaska

PDL-39857

Scripps Institution of Oceanography (Claude E. ZoBell)
MARINE MICROBIOLOGY.
Final Report. Reference 60-14; ASTIA Doc. 236847 (January 1960) 9 p.

Bacteria, marine, biomechanism, physiology, sulfur, pressure, progress report

1961 Biol 72
Vol.18 PDL-40413 thru PDL-40417

Wodzienski, R. J. and W. C. Frazier (Wisconsin University)
MOISTURE REQUIREMENTS OF BACTERIA. I. INFLUENCE OF TEMPERATURE AND pH ON REQUIREMENTS OF PSEUDOMONAS FLUORESCENS
J. Bacteriol 79:572-578 (April 1960)

II. INFLUENCE OF TEMPERATURE, pH, AND MALATE CONCENTRATION ON REQUIREMENTS OF AEROBACTER AEROGENES
J. Bacteriol 81:353-358 (March 1961)

III. INFLUENCE OF TEMPERATURE, pH, AND MALATE AND THIAMINE CONCENTRATION ON REQUIREMENTS OF LACTOBACILLUS VIRIDESCENS
J. Bacteriol 81:359-365 (March 1961)

IV. INFLUENCE OF TEMPERATURE AND INCREASED PARTIAL PRESSURE OF CARBON DIOXIDE ON REQUIREMENTS OF THREE SPECIES OF BACTERIA
J. Bacteriol. 81:401-408 (March 1961)
V. INFLUENCE OF TEMPERATURE AND DECREASED PARTIAL PRESSURE OF OXYGEN ON REQUIREMENTS OF THREE SPECIES OF BACTERIA
J. Bacteriol 81:409-415 (March 1961)

Bacteria, growth, water, biomechanism, pressure, pH temperature

PDL-40399

Fewson, C. A., and D. J. D. Nicholas (Bristol, Eng. University)
UTILIZATION OF NITRATE BY MICRO-ORGANISMS
Nature 190:2-7 (April 1961)

Microorganisms, fungi, bacteria, biomechanism, nitrate

1961 Biol 73
Vol.18 PDL-40321

Tyler, M.E., Margy C. Bielling, and D. B. Pratt
MINERAL REQUIREMENTS AND OTHER CHARACTERS OF SELECTED MARINE BACTERIA
J. Gen. Microbial. 23:153-161 (August 1960)

Marine bacteria from Atlantic coastal waters off Florida, isolated by a technique assuring that all would grow on a sea water medium but not on a distilled water medium, were studied. Of one hundred original isolates, ninety six were characterized by morphological and some physiological properties, particularly those related to mineral responses. All isolates were Gram-negative rods or spiral forms. They grew well in a simple saline-peptone medium, and most were pigmented and motile. All isolates required sodium chloride for good growth, and groupings could be clearly established for those whose mineral nutrition was satisfied, in a casein digest broth, by adding sodium chloride only, sodium chloride plus potassium chloride, sodium chloride plus magnesium salts, or all three salts. Lytic susceptibility in various mineral solutions and growth tolerance to various salt levels were studied. Some overall similarities, and a few correlations between mineral nutrition and physiological versatility were established.

Marine, bacteria, nutrition

PDL-40250

Murti, C. R. Krishna, and B. A. Stone (University College, London)
FRACTIONATION OF THE β-GLUCOSIDASES FROM ASPERGILLUS NIGER
Biochem. J. 78:715-723 (April 1961)

Fungi, Aspergillus, enzyme, analysis, technique

1961 Biol 74
Vol.18 PDL-39858

Florida University.(Seymour S. Block.,Ralph Rodriquez-Torrent, and Margaret B. Cole)
HUMIDITY AND TEMPERATURE REQUIREMENTS OF SELECTED FUNGI
Technical Report Project No. 7165., Task No. 71837 (April-August 1959) 52 p.

Fungi, Aspergillus, Chaetomium, Myrothecium, Penicillium, Rhizopus, Trichoderma, Pullularia, growth, temperature, water, humidity, biomechanism, progress report

PDL-40255

Bethlehem Steel Co. Shipbuilding Division. Central Technical Dept., Quincy, Mass. (L. M. Mosher)
MARINE BORERS AND FOULING ORGANISMS AND THEIR PREVALENCE IN THE VICINITY OF BETHLEHEM STEEL COMPANY SHIPYARD PROPERTIES; SEVENTEENTH ANNUAL REPORT 1960
Research Report No. 93 (April 1961) 60 p.

Progress report, borer, fouler, Teredo, population, distribution, USA

PDL-40249

Haynes, William C. (U. S. Agricultural Research Service, Northern Regional Research Laboratory, Peoria Ill.)
CORRECT DESCRIPTION OF PSEUDOMONAS MILDENBERGII BERGEY ET AL., 1930
J. Bacteriol. 81:385-386 (March 1961)

Bacteria, bionomy

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PDL-39747

U.S. Naval Research Laboratory (J. R. Griffith and G. E. Rohl)
AN ISOCYANATE PRIMER-SEALER FOR MASONRY
NRL Report 5580 (January 1961) 15 p.

Exterior masonry surfaces ranging from new concrete to severely weathered and previously painted concrete, brick, and glazed tile were painted with a reduced solids acrylic emulsion (Rhoplex Ac-33), with and without a tung oil-phenolic spar varnish (Fed. Spec. TT-V 119) or isocyanate primer-sealer. Isocyanate primer composition was (in % by wt) 25 isocyanate (a condensation product of trimethylolpropane and toluene diisocyanate), 20 xylene, 20 cellosolve acetate, 20 butyl acetate and 15 ethyl acetate.

One-year exposure data indicate that such acrylic emulsions are satisfactory on vertical surfaces only with proper priming sealing. Both the spar varnish and isocyanate primers are satisfactory, the latter is particularly good when penetration is desired. A longer exposure is needed to compare them. Horizontal surfaces, and surfaces interrupted by signs and drainpipes, should be carefully primed and painted; otherwise, early failure of emulsion paints is likely.

Brick, cement, coatings(organic), primers, exterior, systems, sealers, acrylic, isocyanates

PDL-39966

Sturrup, V. R.
EXPOSURE TESTING OF CONCRETE AND MASONRY
Ontario Hydro Research News 11(3):34-37 (July/September 1959)

Concrete, brick, test facility, Canada

1961 Cer 36
Vol.18 PDL-39767

Miesenhelder, P. D.
EFFECT OF DESIGN AND DETAILS ON CONCRETE DETERIORATION
J. Am. Concrete Inst. 31:581-590 (January 1960)

Deterioration attributed to faulty concrete is often caused by freeze disruption promoted by inadequate drainage. Exposed for long periods, even dense concrete continues to absorb water at a decreasing rate. Water absorbed during long exposure may be extremely small in quantity, but critical when the concrete is exposed to freezing. A level surface can give trouble is subject to a slow discharge of water. Construction joints may admit water much faster than they release it. Bridge piers, caps, diaphrams and beam ends frequently suffer from water trapped by overlying deck slab joints. Ballast on railroad bridge decks releases its water slowly. Partial melting of snow and ice may maintain pools on level surfaces for many days, or drain into crevices with restricted outlets. Bituminous joint sealant frequently restricts drainage without preventing penetration. Preventative measures include avoidance of designs that retain water, provision of sloping surfaces, and the use of waterproofing or adequate sealing where needed. Photographs illustrate examples.

Concrete, freeze-thaw, degradation, design

PDL-39572

Lyse, Inge (Technical University of Norway, Trondheim)
THE SHRINKAGE AND CREEP OF CONCRETE
Mag. of Concrete Research 11:143-150 (November 1959)

Concrete, shrinkage, creep, humidity, calculation

1961 Cer 37
Vol.18 PDL-39768

Monfore, G. E., and G. J. Verbeck (Portland Cement Assoc., Skokie, Ill.)
CORROSION OF PRESTRESSED WIRE IN CONCRETE
Am. Concrete Inst. 32:491-515 (November 1960)

Field experience and laboratory study show that 3% or more calcium chloride in concrete may seriously corrode or rupture prestressed wire. Significant tensile strength reductions of prestressed wires in laboratory specimens containing 2% calcium chloride were measured after 2-yr storage. There are indications that potentially corrosive chloride ions persist in concrete for long periods, even with initial levels $<1\%$. Pending determination of a safe threshold (which is difficult in short time laboratory tests), disuse of calcium chloride in prestressed concrete is recommended.

Corrosion of prestressed wire is an erratic process, no more than slightly dependent on type of cement, and not greatly influenced by cure temperature. Moist storage of concrete intensifies corrosion, but an appreciable amount may occur under drying conditions. Corrosion is usually associated with large voids(with dimensions of the order of wire diameter) adjacent to the wire, and may be increased or decreased by other metals in contact with the concrete. Both hard-drawn and stress-relieved wires are susceptible, with or without external loading. Longitudinal cracking tendencies dependent on wire drawing conditions may be a factor.

Cement, reinforcement, ferrous, corrosion, stress, calcium chloride

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PDL-37026

Meier-Grolman, F. W.
ON THE CAUSES AND PROGRESS OF AGGRESSION DUE TO THE ATTACK OF CORROSIVE WATERS ON CEMENT MORTAR AND CONCRETE (in German with English summary)
Werkstoffe u. Korrosion 10:739-760 (December 1959)

Cement products, water, sea water, corrosion, review, foreign

PDL-39773

Simpson, W. C., H. J. Sommer, R. L. Griffin, and T. K. Miles (Shell Development Co.)
EPOXY ASPHALT CONCRETE FOR AIRFIELD PAVEMENTS
Proc. Am. Soc. Civil Engrs. 86 (AT 1):57-71 (May 1960)

Epoxy asphalt concrete (EAC) combining graded mineral aggregate with 8 to 10% by wt Epon asphalt binder is prepared by conventional hot-mix asphalt plants and paving equipment. It has Marshall stability values of 15,000 to 20,000 lb and withstands tire pressures in excess of 1000 psi. In repeated gyratory loading simulating B-52 traffic, EAC resists densification and retains its load-carrying ability even under severe conditions of solvent and fuel spillage. In jet-blast tests, EAC performs well even with prolonged after-burner operation which produce pavement temperatures of 800 F. Flexural strength or modulus of rupture is 3 to 6 times that of portland cement concrete, yet flexibility equals that of asphaltic concrete.

Composed of a liquid epoxy resin and a paving grade asphalt with a plasticizer, the binder initially is a black, viscous liquid resembling asphalt. Practical handling temperature in paving operations is 200 to 300 F. Cure time is temperature controlled. Tested at 20 in./min at room temperature, the cured binder has tensile strength of 1000 psi (of initial cross-sectional area) and an elongation at break of 200 to 300%. It is elastic. Finished pavement has the appearance of asphalt concrete. So far, it is

used as 1/2 to 1 in. thick protective overlay on existing pavement. Maximum aggregate size for overlay pavements is 0.25 in.

Airfield, roads, concrete, asphalt, epoxy, polymers, pressureproof, heatproof, fuelproof

PDL-39131

Paix & Cie, France (Nord)
IMPROVEMENTS IN MAKING CONCRETE (in French)
France Pat. 1,190,207; October 9, 1959. 1 p.

A concrete of high mechanical resistance which can be poured at temperatures below 0 C is obtained by incorporating in the aggregate 0.1 to 5% of a mixture of certain nonionic organic compounds and certain mineral salts. The organic compounds are polyethylene glycol ethers of the general formula $R\text{-}O(CH_2\text{-}O\text{-}CH_2)_n\text{-}H$, where R is a residue of a straight-chain aliphatic alcohol, a cresol, or an alkylphenol, the alkyl radical being branched or nonbranched. The salts are alkali or alkaline earth metal sulfates or chlorides, or mixtures of both. The additives accelerate the hardening of concrete by 25 to 30%. For example, a concrete made of 1,125 kg porphyry gravel, 800 kg coarse sand, 275 kg portland cement, 2.75 kg additive (12-18% of an alkylphenol polyethoxy ether and 17-23% of an alkaline earth chloride), and 65 liter water attains a compression resistance of 400 kg/sq cm after 7 days, and 470 kg/sq cm after 28 days.

Concrete, temperature, cold, formulation, foreign

1961 Cer 40
Vol.18 PDL-38760

Toennies, Henry T. (National Concrete Masonry Assoc.)
ARTIFICIAL CARBONATION OF CONCRETE MASONRY UNITS
J. Am. Concrete Inst. 31:737-755 (February 1960)

Flue gas, pure carbon dioxide, and flue gas plus carbon dioxide were used to carbonate 8 x 8 x 16 in. cinder, expanded shale and expanded slag aggregate masonry units in a pilot carbonation chamber. Units were fresh cured or predried at 50 or 75% RH. Test duration was usually 9 hr, with some tests up to 125 days.

Early age drying shrinkage of concrete masonry units was altered by both carbonation with flue gas and carbonation with pure carbon dioxide. With pure carbon dioxide, drying shrinkage was reduced an average of 43%; with flue gas, reductions varied with carbonation time, temperature, and recarbonation moisture condition of units. Greatest reduction shrinkage (up to 53%) occurred when units were treated at temperatures of 150 and 200 F immediately after steam curing; least reduction, when units were treated at 100 F immediately after steam curing.

Considering all samples, reductions in early age drying shrinkage due to flue gas carbonation were greatest when units were treated at 150 F immediately after steam curing. Reductions were generally greater on longer exposures. Differences in total shrinkage of flue gas carbonated and noncarbonated specimens were about the same at the end of a shrinkage test after 10 mo atmospheric exposure as they had been at the end of a shrinkage test at the beginning of the period.

With pure carbon dioxide or flue gas the effects of carbonation on compressive strength, absorption and unit weight were minor. With pure carbon dioxide, both weight gain and gain in carbon dioxide content could be used as measures of carbonation extent of predried masonry units. Shrinkage during carbonation was unrelated to extent of carbonation.

Residual moisture content after drying at 50% RH and 73 F was related to the shrinkage characteristics. Shrinkage of atmospheric-pressure, steam-cured cinder

aggregate units was directly proportional to their residue moisture content after drying.

Concrete, shrinkage, carbon dioxide

PDL-39740

Brill, Robert H. (Corning Museum of Glass, Corning, N.Y.)
THE RECORD OF TIME IN WEATHERED GLASS
Archaeology 14(1):18-22 (Spring, 1961)

Normal microscopy of long-buried or submerged glass shows the weathering crust to be stratified in structure, with a distinguishable layer for each year since burial or immersion. Each layer represents annual progress of decomposition. Layers are counted by mounting a small sample in plastic, cutting to expose a cross-section of the crust, then grinding and polishing. Deduction of the number of layers (counted visually) from the year of recovery gives the burial year, with an accuracy of perhaps 97 to 100%; tolerance reflects occasional difficulty in distinguishing deformed layers.

The technique has been proved on 200 to 400 yr old objects of known burial date. Layer counts as high as 1582 accord with archaeological evidence, but examinations of ancient fragments are as yet too limited for positive conclusions. Prime requisite for successful determination is that the weathering crust be intact. A limiting factor is possible soil abrasion; some glasses leave extremely fragile residues. The relative corrodibility of a glass affects only its layer thickness. Stratification is attributed to seasonal wet/dry or warm/cold cycling, or both.

Glass, aging, weathering, measurement

1961 Cer 42
Vol.18 PDL-39779

Munger, C. G. (Amercoat Corp., South Gate, Calif.)
SEWER CORROSION AND PROTECTIVE COATINGS
Civil Eng. 30:57-59 (May 1960)

Corrosion in concrete sewers and water pipes is a problem only where conditions favor bacterial producers (anaerobic or aerobic) of hydrogen sulfide and sulfuric acid, i.e., in conditions of high average temperature, high organic content, relative stagnation, and significant sulfate content. The growing use of garbage disposal units and rapid industrial expansion aggravate the problem.

Various coatings which protect metal are ineffective on concrete because of its porosity. Asphalts and coal tars are of negligible value; chlorinated rubber and sprayed vinyls are a little better, but all such coatings can pinhole on an imperfect, porous surface. A heavy troweled vinyl applied in several coats totaling 1/8 in. has given excellent protection for 15 yr where brick and tile had failed. Epoxy coatings are irregular in quality: only one or two have survived 1 yr in sewers. Clay liners and tile are often successful where conditions are not severe; weaknesses are joints, sections, cracks caused by settling, and porosity.

The most promising are high-polymer vinyl chloride linings. Sheets at least 60-mil thick, and with integral T-section ribs on the concrete side, are laid over the inner forms and the concrete is poured around them. Ultimately, all joints are thermally welded to form an unbroken vinyl chloride lining.

Concrete, pipe, coating(organic), interior, vinyl chloride, polymers, review

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Brewer, John H., and C. Baxter McLaughlin
DEHYDRATED STERILIZER CONTROLS CONTAINING BACTERIAL SPORES AND CULTURE MEDIA
J. Pharm. Sci. 50:171-172 (February 1961)

To check effectiveness of steam-under-pressure sterilization, a control strip of paper is impregnated with spores of Bacillus stearothermophilus (optimum growth temperature 63 to 65 C) and a calculated amount of culture medium containing an acid-base indicator to serve as a sterilizer control. After exposure the control is placed in a tube of sterile water and incubated. The medium elutes from the strip and supports the growth of surviving bacteria. Proper adjustment of spores per test strip yields a preparation sensitive to 2 1/2 min difference in autoclave sterilization time. The strips may be used in an autoclave run and the test completed in 24 to 48 hr rather than the usual 7 days. The organism is nonpathogenic, nontoxic, nonpyrogenic and will not grow at the official NIH and USP sterility test incubation temperatures (30 to 32 C).

Biocontrol, bacteria, water vapor, temperature, test

PDL-39990

Frear, Donald E. H., ed.
PESTICIDE HANDBOOK. THIRTEENTH EDITION
State College, Pa., College Science, 1961. 286 p.

Insect, fungi, rodents, toxics, manual

1961 Fung 96
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Kare, Morley R. (to S. B. Penick and Co., Inc., New York, N.Y.)
BIRD REPELLENT
U.S. Pat. 2,967,128; January 3, 1961. 3 p.

Seeds, grain, berries and growing crops are rendered distasteful to domestic and wild birds by treatment with a solution, suspension, emulsion, or dust incorporating an ester of anthranilic acid or phenylacetic acid, or dimethylbenzyl carbinyl acetate. Preferred is dimethyl anthranilate (methyl o-N-methylaminobenzoate.) The compounds are soluble in most organic solvents, with propylene glycol preferred. Emulsifying agents or suitable organic co-solvents permit use of a mainly aqueous carrier.

Repellent efficacy varies directly with the concentration; effects of compounds in combination are largely additive. The repellents are nontoxic at the levels used. Additional applications are protection of birds from vermin poison bait and as an anti-picking agents to control chicken cannibalism.

Birds, repellents, patent

PDL-40220

Kupferberg, Alfred B., and George E. Doscher (Ortho Pharmaceutical Corp., Raritan, N.J.)
THE ANTIFUNGAL ACTIVITY OF 3-TRICHLOROMETHYLTHIO-5-(1-ETHYLAMYL)-HYDANTOIN (CHLORDANTOIN)
Antibiotics and Chemotherapy 11:73-78 (February 1961)

Fungi, toxics, chlordantoin, toxicology

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Fung 97
PDL-39787

Spiller, D. (New Zealand. Dept. of Scientific and Industrial Research. Plant Diseases Division)

A STUDY STUDY ON CONTROL OF INFESTATIONS OF THE COMMON HOUSE BORER ANOBIUM PUNCTATUM DE GEER. PART 2. A TEST OF DIESEL OIL AND FRACTIONS 1953-60

New Zealand J. Sci. 3:539-542 (September 1960)

A diesel oil was fractionated into three approximately equal portions A (200 to 260 C atmospheric), B(145-185 C at 33 to 4 more Hg) and C (distillation at 0.5 mm Hg until solids blocked the condenser). Solid residues were discarded. The fractions and the parent oil were tested for control of Anobium punctatum. Single brush coats of the fractions and parent oil were applied to preinfested 1-in. boards of sapwood kahikatea(Podocarpus dacrydioides)at 43, 41, 40 and 50 ml/sq ft, respectively. Treated specimens and controls were exposed for 7 yr in an insectary.

Results assessed by count of annual emergence of beetles showed that the light fractions A and B gave good initial control, but permitted early reinfestation. Fraction C was ineffective initially, but thereafter gave perfect protection. The parent oil was effective; a few beetles emerged as early as 4.3 yr after treatment, but the slight reinfestation was judged insufficient to maintain the Anobium population. Six and a half years after application, no oiliness was detectable on A, B, or parent oil specimens; boards treated with fraction C felt slightly greasy. It was concluded that diesel oil owes its efficacy to a combination of properties and that no spectacular improvement can be achieved by fractionation.

Oil, diesel, fuel, insect, toxic, beetles, wood

1961
Vol.18

Fung 98
PDL-39786

Spiller, D. (New Zealand. Dept. of Scientific and Industrial Research. Plant Disease Division)
TOXICITY OF PENTACHLOROPHENOL TO THE COMMON HOUSE BORER ANOBIUM PUNCTATUM DE GEER II. A TRIAL OF OF EFFECTIVENESS, 1951-1960
New Zealand J. Sci. 3:534-538 (September 1960)

Sapwood blocks of kahikatea, (Podocarpus dacrydiodes) were dip treated with pentachlorophenol at 5.0, 3.5, 2.0, 1.0, 0.5, and 0.2% in kerosene. The blocks were caged individually, and numbers of Anobium beetles were added annually.

At all treatment levels some blocks became infected during the first year; the lowest four concentrations failed completely. The highest concentration gave some control for 8 yr, but pentachlorophenol treatment is not considered effective against Anobium.

Pentachlorophenol, insect, beetles, toxic, wood

PDL-39650

Bronson, Arthur H. (to Richfield Oil Corp., Los Angeles, Calif.)
POWDERED COMPOSITION CONSISTING ESSENTIALLY OF PENTACHLOROPHENOL AND A MEMBER OF THE GROUP OF METAL NAPHTHENATES AND MAHOGANY SULFONATES
U.S. Pat. 2,944,936; July 12, 1960. 2 p.

Tendencies of pentachlorophenol to form toxic dust and to corrode metallic equipment used for treating wood or other cellulosic materials are prevented by addition of 2 to 10% by wt of oily corrosion inhibitors such as alkali metal and alkaline earth metal naphthenates and mahogany sulfonates. Free-flow qualities are not impaired. Use of the regular penta oil solvents is unaffected.

Pentachlorophenol, formulation, corrosionproofer, dustproofer

1961 Fung 99
Vol.18 PDL-40126

Centre national de la recherche scientifique, France (Seine) (by Françoise Flieder)
FUNGICIDAL AND INSECTICIDAL ADHESIVE
France Pat. 1,189,189; September 30, 1959. 2 p.

A fungicidal, insecticidal, white adhesive paste with a pH of 7 is particularly suited to book binding. It comprises 5 to 25% refined wheat flour, 1 to 5% poly(vinyl alcohol), 0.05 to 0.3% mercuric acetate, 0.05 to 0.5% p-chloro-m-cresol, 0.05 to 0.5% hexachlorocyclohexane, 5 to 20% ethyl alcohol, balance water. The adhesive is applicable by brush or spray; appropriate viscosity is achieved by adjustment of the flour-water ratio.

Hexachlorocyclohexane and p-chloro-m-cresol are dissolved in ethyl alcohol; the mercuric acetate, in boiling water. When the poly(vinyl alcohol) has been worked into the alcohol solution, the flour and mercuric acetate solution are stirred in gradually to avoid lumps. After 30-min boiling in a water bath, the paste is ready for use or storage.

Adhesives, books, insect, fungi, toxic

PDL-38743

Farbenfabriken Bayer A.G. Leverkusen-Bayerwerk, Ger.
GASTROPOD COMBATING COMPOSITIONS
Gt. Brit. Pat. Spec. 824,345; November 25, 1959. 3 p.

Derivatives of 2-hydroxybenzanilide are described as effective molluscicides against such gastropods as Australorbis quadelupensis, Biophalaria sp., Lymnaea sp. and Galba sp. Claimed compounds include 5,2'-dichloro-4' - nitrosalicylanilide and 5,2', 5'-trichloro- 4' -nitro-2-acetoxybenzanilide. The molluscicide can be in solid or liquid formulation as required and used in conjunction with insecticides, fungicides, etc. Generally, dilutions or solutions in a concentration of 10^{-1} to 10^{-7} by wt are used.

Foulers, toxics, patent

Deterioration
NRC

1961 Fung 100
Vol.18 PDL-39664

Swinyar, Theodore C. (Collegedale Medical Center, Collegedale, Tenn.)
METHOD AND COMPOSITION FOR PREVENTING THE GROWTH OF MICRO-ORGANISMS ON SURFACES
U. S. Pat. 2,971,883; February 14, 1961. 3 p.

A microbicidal composition consists of 50 gm 2,4, 5-trichlorophenol and 4.5 gm paraffin in 100 ml benzene. The benzene is evaporated and the resultant viscous mixture is coated on container walls and other surfaces to prevent growth of fungi, algae and bacteria. Pentachlorophenol may replace the trichlorophenol as the toxic, the paraffin substituted by spermacetti, beeswax or montan wax, and the benzene with other wax solvents.

In x-ray photo development tanks, trichlorophenol remained on the wall during a succession of film development, fixing and water operations carried out during a protracted period of time.

Coatings(organic), fungi, toxic, tanks, aqueous

PDL-40214

National Pest Control Assoc., Elizabeth, N.J.
INSECT RECORDS FOR 1960
Technical Release 5-61 (April 1961) 12 p.

Insects, distribution, U.S.A., annual report, cockroach, termites, beetles

PDL-39844

Canada. Defence Research Board. Environmental Protection Section
ARMED FORCES MANUAL ON PEST CONTROL
Revised Ed. 1960 217 p.

Insects, rodents, beetles, borers, cockroaches, moths, toxics, biocontrol, fumigants, application, manual, resistant strains

1961 Lac 57
Vol.18 PDL-39304

U.S. Forest Service. Forest Products Laboratory. Madison, Wisc. (F. L. Browne)
AN ATTEMPT TO HASTEN TEST-FENCE STUDIES OF PAINT FAILURES CAUSED BY TOO-FREQUENT REPAINTING
Report 2203 (October 1960) 20 p.

Results of a 6 1/2 yr exposure study indicate that the accelerated technique used for studying the effect of excessive coating thickness fails to reproduce fully the failure patterns characteristic of equivalent repainting in service. The technique does reveal thick coating abnormalities in most coatings in service and may be useful in determining threshold thickness of abnormal performance.

With each of twenty representative house paints (specified), test panels of four siding woods were coated to thicknesses of 5, 10, 15 and 20 mil and exposed outdoors. Applied and dried at least overnight indoors, each coat received at least one day- usually several-of sunshine before repainting. Total thicknesses were calculated, and measured after 1-mo and 4-yr repainting. Thickness variations from the calculated, and as functions of thickness and time are discussed.

After 6 1/2 yr only five of sixteen linseed oil paints showed typical cross-grain cracking: most cracking occurred at 20 mil, progressively less at 15, and 10 and none at 5 mil. Though reasonably successful with these five the technique probably led to overestimates of threshold thickness for cross-grain cracking in practice. At thicknesses of 10,15 and 20 mil, but not at 5 mil, four other linseed oil paints showed irregular cracking atypical of practical service. Regardless of thickness, the remaining seven linseed oil paints checked or cracked in their normal pattern, more or less according to pigmentation. Thick coatings of white lead paints showed no abnormalities. The one varnish vehicle and three alkyd resins showed only the cracking that almost immediately leads to curling followed by flaking or scaling; the thinner the coating, the earlier and greater the deterioration. The various

abnormal disintegrations observed in thick coatings are discussed.

Cross-grain cracking and coarsening of checking or cracking patterns, and shift from flaking to scaling to excessive thickness occurred as soon and as severely on red cedar and white pine as on Douglas-fir and southern pine. Coatings thin enough to behave normally disintegrated soonest on southern pine, next on Douglas-fir, white pine and last on red cedar. All paints disintegrated less rapidly the greater the nominal coating thickness. With zincless linseed oil paints, such as white lead and titanium-lead paints, optimum initial thickness was at least as great as 10 to 15 mil. For zinc-containing linseed oil paints or alkyd-resin paints, initial thickness should not exceed 5 mil.

Coatings(organic), weathering,test, accelerated, wood

PDL-39655

Rushton, Alma L., and Millard Rushton
COATING COMPOSITION
U.S. Pat. 2,956,897; October 18, 1960

The finely ground, impure molybdenite flotation concentrate recovered during treatment of copper sulfide ores is an excellent exterior paint pigment. The usual film forming vehicles are suitable, typically at 3 parts by volume to 1 part molybdenite concentrate. Molybdenite has unusual adherence, covering power, and heat resistance which enable it to survive thermal degradation of the vehicle on hot substrates. Great resistance to weather, erosion and fire particularly qualify molybdenite for roof paints.

Natural color is gray. The average 10% silica naturally present serves as an extender and adds desirable sparkle. Other extenders may be added, e.g., clay. Finer grinding is usually unnecessary.

Coatings(organic), temperatureproof, weatherproof, pigment, molybdenum compounds(inorganic)

1961 Lac 59
Vol.18 PDL-37653

U.S. Puget Sound Naval Shipyard, Bremerton, Washington. Material Laboratories (L. H. Schultz and M. E. Phelps)
REINFORCED PLASTIC COATINGS FOR THE PROTECTION OF METAL SURFACES
Interim Report P-300-10 (January 1960) 20 p.

Progress over a 3-yr period is reported of a simulated-service study of five polyester and epoxy resins, with and without glass cloth reinforcement, as substitutes for standard Navy anticorrosive ships' plates. With and without prior sandblasting of the plastic surface, the steel test panels were top coated with antifouling boottop or topside paint and immersed in sea water, continuously or intermittently at tide frequency.

Data confirm previously reported 2-yr exposure findings. An epoxy resin (Bakelite ERL-2774) seems the most durable of those tested. Glass reinforcement increases durability of the subcoat. Good paint adhesion requires sandblasting of resin surface, but fine roughing is as effective as coarse. Formula 117 Wash Primer does not improve the paint-resin bond. Antifouling Paint Formulas 15 HP and 121 are superior to Formula 105. Intermittent immersion generally is more destructive than constant immersion. The exposure of surviving panels is being extended, and no recommendations are made pending final results.

Coatings(organic), glass, reinforcement, primers, ship, sea water, polyester, epoxy, polymers

PDL-36001

Oeteren-Panhäuser, K. A. van
CORROSION PROTECTION BY PAINT SYSTEMS AS APPRAISED BY STATISTICS AND EXEMPLIFIED BY SOME PROMINENT STEEL BUILDINGS (in German with English summary)
Werkstoffe u. Korrosion 10:442-445 (July 1959)

Steel, structures, corrosion, coatings(organic), cost, foreign

1961 Lac 60
Vol.18 PDL-39048

Hoffmann, E. (Australia. Commonwealth Scientific and Industrial Research Organization)

ADHESION OF LATEX PAINTS TO PLASTER UNDER HUMID CONDITIONS

J. Oil & Colour Chemists' Assoc. 43:196-200. (March 1960)

Specimen blocks of the same plaster mix were coated to 0.0025 and 0.006 in. thickness with a pure latex emulsion and a laboratory compound and a commercial latex-based paint. Specimens were subjected at room temperature to water (dammed on the coated surface) to 67, 80, 90 and 100% RH (coated side only, and both sides), and to 6 mo protracted wet-dry cycling (7 hr under water and 17 hr drying). Initial adhesion of all dry films was over 80 psi. Adhesion of pure latex films under water fell to 10 psi within 1 hr and to 5 psi within 24 hr; water absorption averaged about 0.05 gm/sq cm. A 14-day exposure of paint films caused no appreciable loss at 67% RH and very little at 90% RH, but at 100% RH film adhesion fell to 6 to 20 psi. This sharp decline may be explained by the pore volume distribution in the set plaster and pore wall condensation characteristics; pore diameters were 90%> 2500 A, 9% between 250 and 2500 A, 1%<250 A. Adhesion was measured on specimens (first dried to stability) after 1, 2 and 6-mo cycling. Loss of adhesion after 2 mo was moderate but increased greatly at 6 mo.

General conclusions are that adhesion retention is not influenced by film thickness, film aging (2 to 180 days), or pigment/binder ratio. Variously compounded latex paints behave substantially as does pure latex. Some adhesion failures may result from winter condensation.

Coatings,(organic), latex, humidity, adhesion, cement products

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Lac 61
PDL-38303

Battelle Memorial Institute, Columbus, Ohio, Radiation Effects Information Center (Ramona A. Mayer, Norman J. Broadway, and Stephen Palinchak)

THE EFFECT OF NUCLEAR RADIATION ON PROTECTIVE COATINGS
REIC Report 13; ASTIA Doc. 241430 (July 1960) 48 p.

Coatings generally considered for use in the aviation industry are based on phenolics, furanes, alkyds, silicone alkyds, vinyls, epoxies, nitrocellulose, neoprene, and styrene-butadiene. Coatings and paints prepared from all these resins except poly(vinyl chloride) and nitrocellulose seem satisfactory for use after exposure to 8.7×10^{10} ergs/g (C) (1×10^{9} r). The vinyls and nitrocellulose resins are least resistant, and satisfactory only to the 10^{10} ergs/g (C) exposure. Type of damage to be expected from irradiation of protective coatings based on these polymers is tabulated. Exposure of phenolics up to 500 F (the only coating tested above room temperature) has little effect at 8.7×10^{10} ergs/g (C).

Additives, such as pigments and plasticizers, and nature of substrate influence coating stability. Highly pigmented gloss coatings are generally more resistant than similar coatings containing lesser amounts of pigments. Carbon black inhibits damage; toluidine red has little effect, whereas titanium dioxide appears to accelerate damage. Coating systems, especially lacquers, employing wash primers embrittle and adhere poorly to the substrate. No data are available on the effect of wash primers on stability of coating systems. Coating degradation begins at lower dosages over steel substrates than over asphalt. Coatings irradiated while still wet are less stable than when dried.

Alkaloy (furane base) and Epon-395 (epoxy base) coatings have good chemical resistance after exposure to approximately 8.7×10^{10} ergs/g (C) (10^{9} r). Irradiation destroys the resistance of Amphesive-801 (a modified phenolic) to sodium hydroxide and hexone (methyl isobutyl ketone). Epon-1001 also loses its resistance to hexone, but Epon-395 is made resistant to sulfuric and hydrochloric acids by gamma radiation.

Coatings(organic), high energy, pigments.

Deterioration
NRC

Farbenfabriken Bayer A.-G., Leverkusen-Bayerwerk, Ger.
UNDERWATER COATINGS RESISTANT TO GROWTHS
Gt. Brit. Pat. Spec. 834,875; May 11, 1960. 2 p.

Marine growth is inhibited by coatings containing chlorinated dihydroxybiphenyls, such as tetrachlorodihydroxybiphenyl, and/or their calcium, zinc, copper or mercury salts. Coatings also may contain metal oxides, especially zinc oxide or copper oxide. Chlorinated dihydroxybiphenyl content is 5 to 15% of total pigment content; PVC is 20 to 40%. Binding agents include colophony, tall oil, alkyd resins, and cyclized or chlorinated rubber. A typical composition(used over a chlorinated rubber--wood oil paint over a chlorinated rubber--red lead primer on metal) comprises, in parts by weight: 80 Colophony WW, 17 medium fatty glycerol linseed oil alkyd resin, 3 cyclized rubber, 40 lacquer benzine, 0.17 naphthenate of cobalt-lead-manganese (1.5--22.0--1.5% metal), 153 zinc oxide, and 23 zinc salt of tetrachlorodihydroxybiphenyl.

Coatings(organic), foulers, toxics, patent

PDL-38627

Plant, D. A.
MEASURING THE LIGHT FASTNESS OF PIGMENTS(in Dutch)
Verfkroniek 32:308-312 (July 1959)

Pigments, discoloration, tests, standard, foreign

PDL-40375

American Society for Testing Materials, Philadelphia, Pa.
REPORT OF COMMITTEE E-12 ON APPEARANCE.
1961 Preprint 34a 10 p.

Light, absorption, reflection, measurement, standard, specification

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Lac 63
PDL-38711

Francis W. J. (U. S. Norfolk Naval Shipyard), Herman S. Preiser, and Frank E. Cook (U. S. Bureau of Ships)

HOW CATHODIC PROTECTION AFFECTS SHIPBOTTOM COATINGS

Corrosion 16:12, 14 (December 1960)

Sandblasted mild steel panels were coated with combinations of various anticorrosive undercoat systems and antifouling topcoat systems (all specified) and submerged in sea water for 22 mo at Nickel's Harbor Island. Tests were made at cathode potentials of -1.0 v using galvanic anodes, and at -1.5 to 6.0 v using energized steel anodes.

Sixteen of the twenty-three combinations exposed as controls without cathodic protection suffered little or no damage, three showed moderate failure, and four failed severely.

Five of the eleven coating systems exposed to -1.0 v were satisfactory: (1) Vinyl/ F-121, Standard Navy Vinyl System in 20 and 10-mil thicknesses; (2) 14N/15HPN, Standard Navy Hot Plastic System, 32 mil; (3) POR I/F-121, porcelain enamel coating, 4 to 17 mil; (4) Vinyl/SAR, Standard Navy Vinyl anticorrosive with experimental Saran antifouling coating, 11.5 mil; and (5) Vinyl/F105, Standard Navy Vinyl anticorrosive with Cold Plastic antifouling, 12 mil. In rating these coatings, the emphasis was on complete hull systems having requisite antifouling quality.

Of the fourteen dielectric shield coatings tested cathodically under potentials of -1.5 to 6.0 v, three are satisfactory for use near energized inert anodes on ship bottoms: (1) Chloroprene/F-121: 125-mil sheet chloroprene; (2) Epoxy-Gr VI/ F-121, epoxy-glass reinforced, cold cure laminate, 65 mil; and (3) Epoxy-Polysulfide V/F-121: epoxy-polysulfide copolymer, troweled on, cold cure, 85 mil.

Criteria were resistivity, ease of application, adhesion, resistance to alkali products of electrolysis, impermeability to sea water, toughness and flexibility.

Coatings(organic), systems, ships, cathodic protection, comparison, sea water

Deterioration
NRC

1961 Lac 64
Vol.18 PDL-39108

Speight, C. (United Ebonite and Lorival Ltd., Bolton, Eng.)

OXIDISED RUBBER PAINTS RESIST CORROSION

Paint. Manuf. 30:323, 336 (September 1960)

Paint resin potentials of a lightly oxidized rubber available in 50% white spirit solution as Lorival R3B (solution viscosity 3000-5000 poises), and a more highly oxidized grade, Lorival R.200 (200,000 poises) are outlined. To flat paints and undercoats, R3B imparts good flow and nonsettling properties. Pigments in such paints settle out only to a soft, easily dispersed mass. Methods of paint manufacture are described. All usual pigments and fillers are compatible, as is virtually any other resin soluble in white spirit. Undercoats can be recoated next day. R3B gloss paints are as slow to harden as standard linseed oil paints.

Coatings based on R.200 when applied to clean surfaces and baked at not less than 180 C are highly resistant to corrosion and temperatures up to 550 C; inclusion of powdered aluminum gives resistance up to 700 C. The rubber is soluble in white spirit and compatible with most paint ingredients. It is brown when oxidized, and appropriate pigmentation can impart gloss, semigloss or matt finish. Baking may be carried out by almost any type of heat application, even by open flame or while in use on hot objects such as smoke stacks. Incorporation of oxidation catalysts, such as cobalt salts, greatly reduces the oxidation temperature.

Coating(organic), rubber, corrosionproofing, temperatureproofing

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Lac 65
PDL-39612

Keane, John D., and Joseph Bigos (Steel Structures Painting Council, Pittsburgh, Pa.)
TEST OF PAINTS FOR WATER TANK INTERIORS
J. Am. Water Works Assoc. 52:623-630 (May 1960)

The internal surface of a 1-million gal open-topped steel tank at Ambridge, Pa., was divided into fifty-four panels, each of which received some combination composed from twelve paint systems, two pretreatments, and ten methods of substrate blast cleaning, varying as to type and size of abrasive. Pretreatment, if any, consisted of either a vinyl wash coat or phosphating. Half of each panel was brush painted; the other half sprayed. All materials and techniques are specified. The third paint coat was dried 5 days before the tank was filled. The chlorinated fresh water contained an average 0.63 ppm residual chlorine.

The tank was drained and inspected annually. After 8 yr, detailed data show the vinyl systems superior to all others tested, regardless of surface preparation, pretreatment (if any) or brand of material used. The different surface preparations show only slight variation in performance; even a power wire-brushed surface is almost equal to blast-cleaned, with small failure caused by the lifting of scale remnants.

Phenolic systems are almost all in poor condition; twenty panels have failed completely. Intercoat peeling, which occurred during the first year, is not completely eliminated by use of the solvents ethylene glycol monoethyl ether or methyl isobutyl ketone.

With the vinyls, the only evidence of rusting is a slight blistering which occurred after 4 yr; it has not progressed. Success of the vinyls is attributed in part to careful application and correct solvent balance.

Tanks, steel, water, coatings(organic), systems, interior, vinyl, phenolic, polymers

Deterioration
NRC

1961 Lac 66
Vol.18 PDL-39549

U.S. Naval Shipyard, Brooklyn, N.Y. Material Laboratory (S. Tudor)
DEVELOPMENT OF COATINGS FOR USE WITH CATHODIC PROTECTION
Laboratory Project 5589-7, Final Report ASTIA Doc. 246690 (November 1960) 19 p.

Ten different coatings brushed on sandblasted mild steel panels were subjected to d-c electrolysis in synthetic seawater. A coal-tar epoxy (type A) withstood applied potentials of 2 to 20 v, with excellent adhesion and resistance to peeling for 503 hr even adjacent to bare metal areas. Most other coatings tested blistered and lost adhesion when subjected to 3 to 6 v. The type A coating has the disadvantages of being black and slightly discoloring water white petroleum products.

Combinations of the coal tar epoxy as a primer with two other epoxy topcoats showed no visible or measurable electrical faults after 690 hr at 2 to 3 v. These light-colored systems can protect petroleum tanker compartments equipped with magnesium anodes without discoloring 'white' cargo.

Tanks, coatings(organic), interior, cathodic protection, sea water, petroleum products, coal tar, epoxy, polymers

PDL-39797

Becker, John C., Jr., William B. Horback, and Karl W. Merkel (Celanese Corp. of America, Summit, N.J.)
THE REPAINTING OF CHALKY SURFACES WITH EXTERIOR EMULSION PAINTS
Official Digest 30(Part I):923-938 (September 1958)

Coatings(organic), poly(vinyl acetate), chalking, exterior, aqueous

1961
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Met 197
PDL-37435

Sandia Corp., Albuquerque, N.M. (Vernon E. Arnold and Shary D. Holmes)
PROTECTING MAGNESIUM FROM CORROSION
Technical Memorandum SCTM 7-60(16) (January 1960) 17 p.

A satisfactory coating system for magnesium uses Dow-17 (light coat), wash primer Mil-C-15328, vinyl zinc chromate primer Mil-C-15930, and two top coats of vinyl-alkyd enamel Mil-C-15936. When properly applied (painted before and after assembly), this system gives reasonable protection up to 250 F even with potential galvanic couples. Pyrolysis of vinyls at 275 F creates acid and hygroscopic products which corrode the base material severely whether or not the part is exposed to an adverse environment. For applications above 250 F, a silicone or other heat resistant system should be used.

HAE Process electrolytic anodizing is not recommended. It forms a glassy surface resistant to heat and abrasion, but vulnerable to chipping, cracking and spalling. The process requires critical control, and the film is cathodic to magnesium.

Magnesium, corrosionproofing, surfacements, coatings(organic) PDL-39661

David, Bernard
COATING COMPOSITIONS
U.S. Pat. 2,970,927; February 7, 1961. 2 p.

Metal surfaces are protected against oxidation, corrosion, and weld attachment to other surfaces during heat treatment up to 1800 F by precoating with a homogeneous 7.5 - 8:1 suspension of colloidal graphite and either silver, gold, or platinum. The medium may be any nondrying vegetable or mineral oil; castor oil is preferred. Subsequent removal of the coating leaves the surface unaffected.

Metals, coatings(metallic), temperatureproofing, graphite, silver, gold, platinum, patent

1961
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Met 198
PDL-39133

Pechiney (Compagnie de produits chimiques et électro-métallurgiques)(by Marcel Riou and Henri Richaud)

PROTECTION OF METALS

France Pat. 1,174,045; March 5, 1959. 5 p.

Metals are protected against atmospheric corrosion by treatment with halogenated organic compounds containing at least one polar group. The compounds have a strong affinity toward metal surfaces and are chemically resistant. The compounds can be saturated or unsaturated aliphatic hydrocarbons, cyclic hydrocarbons or a combination of both. They are represented by the formula $P(CXY)_n(CH_2)_mQ$, where P is a halogen, hydrogen or a polar group, X and Y are identical or nonidentical halogens, and Q is a polar group. Polar groups can be NH_2, NO_2, CN, OH or, preferably, acidic radicals able to combine with metals such as COOH, SO_3H, OSO_3H, $OP(O)(OH)_2$, $P(O)(OH)_2$, either in the free form or as salts, esters or amides. The halogens can be fluorine, fluorine and chlorine, fluorine and bromine, or fluorine and iodine. The halogenated compounds can be used individually or in mixtures, and need not be pure. For example, suitable mixtures are the products of partial oxidation of polymers and/or copolymers, or the products of the reaction between halogenated monomers and a low molecular weight alcohol. The metallic surfaces can be treated by spraying or immersion in a solution containing 0.1 to 20 gm/liter of the halogenated compounds in water or in an organic solvent or, in the case of high molecular weight compounds, by brush coating. Such coatings can serve as laminating adhesives if the metal is to be combined with plastics. According to the nature of the protective compounds, the treatment is carried out at 20 C or preferably between 70 C and the boiling point of the solution. Excellent protection is obtained when anodized aluminum or its alloys are immersed in boiling solutions of the halogenated compounds.

Metals, surfacements, aluminum, halogenated compounds (organic), foreign, patent

Deterioration
NRC

1961 Met 199
Vol.18 PDL-37870

Carson, J.A. H.(Canada Defense Research Board. Pacific Naval Laboratory, Esquimalt.)

ZINC AS A SELF-REGULATING GALVANIC ANODE FOR SHIP HULLS

Corrosion 16:99-104 (October 1960)

Service trials were carried out on hull anodes of high purity zinc and zinc alloys for 3 yr. Evaluation was based on: (1) ability to reach and maintain their current design output, (2) suitability of the anode geometry, arrangement and method of fastening; (3) avoidance of unwanted secondary effects such as excessive adjacent paint stripping, and (4) cost in comparison to other cathodic protection systems.

Zinc anodes of suitable composition are shown to be capable of providing complete protection for extended periods in sea water. The current output of alloyed anodes (0.3% aluminum or 0.1% aluminum + 0.05% cadmium) is reliable and predictable because polarization does not occur with time.

The outstanding advantages of the zinc anode systems are self-regulation, improved current distribution, and competitive prices. Compared to the cheapest controlled type system, either galvanic or impressed voltage type, the zinc anode systems at 13 cents sq/ft/yr costs: (a) slightly more for large wetted hull areas of around 50,000 sq ft, (b) slightly less for hull areas around 15,000 sq ft, and (c) markedly less for smaller hull areas.

Anodes of suitable design can have useful current outputs for periods of 8 yr in sea water. They cause little or no accelerated break-down of the adjacent hull paint. Bolting is a satisfactory method for fastening to a ship's hull.

Recommendations are made for: (1) more widespread use of zinc anodes for cathodic protection systems both on and in ships, and (2) the use of high purity (ASTM Special High Grade) zinc alloyed with either aluminum or aluminum + cadmium as the standard zinc anode material for all sea water applications.

Zinc, anodes, cathodic protection, ships

1961
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Met 200
PDL-38140

O. P. Arora and M. Metzger (Illinois. University, Dept. of Mining and Metallurgical Engineering)
EFFECT OF VACANCY CONDENSATION ON THE CORROSION SUSCEPTIBILITY OF SUBGRAIN BOUNDARIES IN ALUMINUM
Acta Metallurgica 8:49-52, (January 1960)

Rapid and selective corrosion along subgrain boundaries in high-purity aluminum cooled at an intermediate rate from elevated temperatures can be produced by exposure to hydrochloric acid of appropriate composition. The explanation of the unusual corrosion susceptibility in terms of atmospheres of impurities is challenged, and an alternative presented attributing the phenomenon to condensation of lattice vacancies on the subboundaries during cooling. Supporting evidence is derived from comparison of an etch pattern with the pattern, described by Doherty and Davis, of surface pits formed under the oxide film by condensation of vacancies.

Aluminum, corrosion, mechanism

PDL-39573

George, P. F. (Dow Metal Products Co., Midland, Mich.)
STOP CORROSION ON MAGNESIUM
Precision Metal Molding 18:69-71 (May 1960)

Eight recently developed treatments are reviewed. Electroless nickel uniformly coats all surfaces including dissimilar metal assemblies. In hardness and abrasion resistance it compares with chrome plate but is simpler and cheaper to apply. It improves fatigue strength of magnesium alloys.

Two types of porcelain enamel (lead oxide and lithium phosphate) having a firing temperature just below 1000 F are applicable to most magnesium alloys. Industrial and rural outdoor exposure testing shows no corrosion after 6 mo. Nontoxic lithium phosphate enamel withstands the repeated heating and cooling of cooking equipment.

Deterioration
NRC

Clear anodize and the anodize impregnation process are modifications of Dow 17. The thin transparent coating of clear anodize (which requires only 40 v for a very short time) may be covered with a clear or tinted baked enamel. Some surface preparation is usually required. In low cost and corrosion resistance it excels electroplate. Anodize impregnation seals porous areas against hot oils and water at 40 psi and forms a protective paint base.

Ferric Nitrate Pickle bright pickels all alloys at lower cost and with less tendency to stain than other pickles. It leavea a bright surface, with a thin chromate film providing a good base for clear baked enamels. It is especially suited to magnesium surfaces which are to be left unpainted.

In magnesium assemblies tin plated fasteners are more compatible galvanically than cadmium or zinc; 0.00025-in. tin suffices. Tributyltin oxide is a superior substitute for zinc chromate in paint primers over coupled magnesium. If corrosion starts, the cell cathode is plated with tin.

Addition of magnesium to aluminum alloys containing iron improves their galvanic compatibility with magnesium. Four types of 5056 aluminum rivets, varying in magnesium content and aluminum purity, were riveted on HM21 magnesium and subjected to 200-hr salt spray followed by heat testing to 800 F. Both 4.3 and 5.2% magnesium rivets of 99.99%-aluminum were compatible up to 800 F. Between 300 and 400 F, the 99.90% aluminum rivets were incompatible at both 5.2 and 4.3% magnesium. High purity aluminum is essential at 300 to 400 F.

Magnesium alloys, surfacement, coatings(ceramic), corrosionproofing, plating, couples, fasteners, review

1961
Vol.18

Met 202
PDL-39333

Negreev, V. F., and D. M. Abramov
COMPOSITION OF CORROSION PRODUCTS OF STEEL RESULTING FROM PERIODIC WETTING BY SEA WATER (in Russian)
Akademiia Nauk Azerbaidzhanskoi SSR, Baku. Doklady 15(12):1119-1121 (1959)

Marine steel constructions such as piers, which emerge from the water but are periodically wetted by it under conditions of full access of oxygen, show a gradual surface accumulation of corrosion products. The corrosion layer can reach a thickness of 10 mm or more. Corrosion products were analyzed at heights of 0.3, 0.5, 0.8, 1.0, 2.0, and 3.0 m above water level. The maximum moisture content, 23.6-24.1%, as well as the highest content of ferric oxide (Fe_2O_3), 60.6-65%, were found at heights of 0.3-0.5 m, and coincided with the zone of maximum corrosion characterized by a bright red sediment on the metal surface. The moisture and ferric oxide contents decreased gradually at heights above 0.5 m, and at 3.0 m were 8.5 and 35.7%, respectively. Thus, the rate of corrosion of unprotected steel in the zones of periodic wetting with sea water is essentially determined by the chemical activity of the ferric oxides formed, their degree of hydration, their content of active trivalent iron, and their porosity. The oxide layer, which is an active center of cathodic depolarization, is assumed to exert its action continuously, not only during periods of wetting with sea water or drying of the moisture film. This is confirmed by the fact that protective metal coatings, such as zinc, whose oxides cannot be reduced to lower valence oxides, and hence do not act as depolarizing agents, are less corroded in the zones of periodic wetting than in zones permanently immersed in water.

Steel, structures, corrosion, sea water

1961 Met 203
Vol.18 PDL-37922

Cox, Brian (Gt. Brit. Atomic Energy Research Establishment)
OXIDATION AND CORROSION OF ZIRCONIUM AND ITS ALLOYS
Corrosion 16:86-90 (August 1960)

Extruded rod and annealed rolled sheet specimens of arc-melted sponge zirconium were surface finished to varying degrees of smoothness and corroded in steam or aqueous solutions at 300 C. From weight gain and electron micrography studies it is concluded that, unlike Zircalon-2 and carbon-melted zirconium, the oxide film on arc-melted zirconium fails initially as a result of more rapid oxidation along the grain boundaries. Stresses set up in the film by this preferential attack along grain boundaries cause cracking of the film parallel to the boundaries. Subsequent failure within the grains causes the final disintegration of the oriented protective oxide and its replacement by a loose coating of unoriented ZrO_2. No significant difference in effect was seen between steam and aqueous corrosion, or between different surface finishes.

Zirconium, oxidation, corrosion, mechanism

PDL-39663

Greenberg, Sherman, Robert D. Misch, and Westly E. Ruther (to the United States Atomic Energy Commission)
CORROSION REDUCTION
U. S. Pat. 2,970,885; February 7, 1961. 3 p.

Corrosion of magnesium alloys is greatly reduced in 150 C water (as in nuclear reactors) by holding the pH at 4 to 7, preferably at 6 to 7. Sulfuric or, preferably, hydrofluoric acid serves to control pH. The technique not only is effective by itself but also seems to enhance inhibition by other agents, notably by fluoride and other halide salts. Tests with various alloys show that the two methods jointly

can hold corrosion well below any hitherto known rates. Fluoride may be of sodium, potassium, ammonium, lithium or lead.

Magnesium alloys, corrosionproofing, water, temperature, patent

PDL-39665

Gerhardt, Carl. W.
METHOD AND APPARATUS FOR MEASURING CORROSION RATES
U.S. Pat. 2,972,248; February 21, 1961. 6 p.

A simple mechanical method is presented for determining either the corrosivity of an environment or the corrosion rate of any resilient material. A specimen in the form of a helical spring (tension or compression), lever spring, or torsion bar is exposed under constant load. Change in strength measured against time reflects corrosion rate or corrosivity. Erosion may be measured similarly.

Alternatively, duplicate spring specimens may be rack mounted in series and mutually loaded in tension or compression. One specimen is protected from the environment, and progressive loss of strength by the other is indicated by supplementary movement at the junction.

Corrosion, rate, measurement, technique, patent

PDL-40400

Minchin, Leslie T.
BACTERIAL CORROSION OF UNDERGROUND PIPES
Coke and Gas (England) 22:392-397, 411. (September 1960)

Pipes, underground, iron, corrosion, soil, bacteria, sulfur

1961 Met 205
Vol.18 PDL-38330

Willard R. Scott, Jr., Gilson H. Rohrback and Harold A. Parker-Jones (Crest Research Laboratories, Inc.)
MECHANISM OF CORROSION AND CORROSION INHIBITION OF STEEL IN WEAK ACID SOLUTION: DETERMINATION OF QUANTITATIVE LOCAL CELL POLARIZATION CURVES
Tech. Rep;..ASTIA DOC.213227 (February 1959) 117 p.

Steel, polarization, salt water, aqueous, acid, corrosionproofers, mechanism, measurement, corrosion,

PDL-39656

Bernard, George G., and Orrin C. Holbrook (to the Pure Oil Co., Chicago, Ill.)
METHOD OF MEASURING CORROSION RATES
U. S. Pat. 2,963,349; December 6, 1960. 4 p.

Amount of adsorption of certain nitrogenous dyes on metal (particularly ferrous) surfaces is directly related to amount of corrosion. The degree or rate of corrosion of a specimen exposed in a dyed corrosive liquid medium can be followed with considerable accuracy by colorimetric measurement of the medium. Although with many metal-dye-medium combinations the weight loss-dye adsorption relationship is substantially linear, any exact quantitative relationship cannot be assumed. Each corrosion system must be considered to have its own dye adsorption characteristics. Screening tests should be run to select conditions in which the dye is not destroyed or the metal oxide washed away.

To measure the amount of corrosion in a system, total surface area of exposed metal must be known; thus the method is not directly applicable to complex existing equipment. Suitable dyes include methylene blue, Bismarck brown, crystal violet, methyl violet, and Congo red.

Corrosion, rate, measurement, indicator

1961
Vol.18

Met 206
PDL-40128

Pechiney-Compagnie de produits chimiques et électro-métallurgiques, France (Seine)
PREVENTING CORROSION OF OXIDIZED ALUMINUM, MAGNESIUM, AND THEIR ALLOYS BY IMPREGNATION WITH MONOMERS AND POLYMERIZATION IN SITU (in French)
France. Pat. 1,192,228; October 23, 1959 3 p.

A process for finishing artificial oxide films on aluminum and magnesium and their alloys is described. Films are made to adsorb to saturation one or more monomers in a vaporized state. The adsorbed monomer is then completely polymerized by high penetration gamma or x-rays. Suitable, relatively volatile monomers include vinyl chloride, vinyl acetate, vinylidene chloride, trifluorochloroethylene, tetrafluoroethylene, acylonitrile and methyl methacrylate.

Monomer adsorption and polymerization require a closed atmosphere free of air and moisture, and below 60 C. The freshly oxidized metal is immersed in vaporized monomer and irradiated immediately or later. Irradiation time depends on intensity; with a 10-to 20-curie source a few hours are required. At least 1 Mev is required to penetrate the walls of the treatment chamber; with an intricate part, the metal being coated. The small amount of material adsorbed does not affect dimensions or appearance. Bound within the pores of the oxide, the polymer is not vulnerable to rubbing or solvents.

The model apparatus comprises a vertical cylindrical chamber with one valve (LV) in its solid bottom, and a second valve (UV) in its removable, sealable cover. LV is connected to a spherical reservoir of monomer(s); UV, to a vacuum pump. With the metal to be treated inside the chamber, and LV closed, air and moisture are exhausted. With UV closed, LV is opened, filling the chamber with monomer vapor. Radiation is applied when the chamber returns to thermal equilibrium, care being taken to avoid the reservoir.

Aluminum, magnesium, corrosionproofing

Deterioration
NRC

1961 Met 207
Vol.18 PDL-38694

U.S. Wright Air Development Division (E. C. Theiss)
SALT-SPRAY CORROSION TESTS
Technical Report 60-272; ASTIA Doc. 243965 (June 1960)
54 p.

A test program was conducted to develop a means of correlating natural and indoor corrosion rates with determinations by accelerated weathering. Natural environment tests were of 1 yr duration at Patrick Air Force Base, Florida. Corrosion rates were determined by weight loss in single metal panels of 1020 steel, stainless steel, aluminum 2024-T3, aluminum 1100-H14, Alclad 7075, magnesium AZ-31 and bimetallic panels of these metals and copper; by loss in tension of spring-type corrosion indicators; and by change in electric conductance of probes and transducers. Corrosion rate was affected most by direct contact with salt spray or salt-laden air, with some correlation appearing for temperature and humidity.

A series of laboratory tests were then conducted to determine whether comparable results could be obtained in the salt spray test chamber. Severe attenuation in the fog distribution pattern (the only parameter studied) was corrected by adjusting the pressure of the spray nozzle and adding an auxiliary baffle. Tests conducted on identical specimens indicated that results consistent within 9% can be produced if fog distribution is even.

Corrosion, tests, weathering, salt spray, comparison, steel, stainless, aluminum, magnesium, copper, couple corrosion

PDL-40382

Leith, W. C., and W. S. McIlquham
ACCELERATED CAVITATION EROSION AND SAND EROSION
American Society for Testing Materials, Philadelphia, Pa.
1961 Preprint 93a 16 p.

Metals, erosion, sand, cavitation, test, water, oil, lubricants, stainless, steel, bronze, iron, chromium, comparison

Deterioration
NRC

1961 Met 208
Vol.18 PDL-39437

Bommer, Ernst August
CORROSION PROTECTION BY CHROMIUM COATING(in German with English summary)
Glasers Ann. 83:434-437 (December 1959)

In the 'Inkromierung' process steel parts are heated in a nonoxidizing atmosphere (hydrogen) to 1000 C along with crystalline ferrochromium and ceramic pieces (as catalyst). Hydrochloric acid is fed in, resulting in formation of chromium chloride which vaporizes and reacts with iron. An iron atom is interchanged for each atom of chromium deposited. Depending on length of operation, a 0.1 to 0.3 mm layer is formed; chromium content varies from 30% at the surface and decreases continuously toward the core. A minimum of 13% is necessary for corrosion resistance. A 6-hr oven charge results in a chromium diffusion layer of 150 to 200μ (the 13% point is at 100 to 120μ). The parts are then heat treated and the oxide layer removed by pickling. Any base metal may be treated by this process but higher carbon contents weaken the chromed zone because of the formation of chromium-iron-carbide layers. Carbon diffusion at high temperatures can be prevented by addition of titanium to the alloy (IK-steel). Stress valves were evaluated on screws and nuts with low carbon (0.04 to 0.07%), high carbon (0.30%) and IK-steel. All metals met the impact test but only the IK-steel screws could be bent without breakage and met standard requirements for stress values. No rust spots appeared on IK-steel screws after 10 mo in still and flowing water at room temperatures, other screws started to rust after several days. Only isolated rust spots were found on the treated samples after storage for 6 mo in 3% sodium chloride solution.

Steel, diffusion coatings, chromium, technique

1961 Met 209
Vol.18 PDL-38830

Bol'shutkin, D. N., V. V. Gavranek, and M. Ya. Fuks
X-RAY INVESTIGATION OF CAVITATION EROSION OF METALS
(in Russian)
Fiz. Metal. i Metalloved. Akad. Nauk S.S.S.R.
9:722-725 (May 1960)

The process of crystallite breaking and microdeformations in stainless steel 1Kh13, copper, and monocrystals of aluminum, subjected to cavitation erosion in water by means of a magnetostriction vibrator, was studied by x-ray diffraction techniques. The x-ray diagrams show that the degradation of metals by cavitation erosion is analogous to brittle fracture, and is accompanied by a certain degree of plastic deformation in the initial stage only, when there is selective fragmentation of crystallites. This explains the relatively high resistance to cavitation corrosion of finely grained alloys, and the reduction of this resistance by microcracks on the metal surface. On the basis of the results obtained, the following interpretation can be given of the kinetic curve expressing the weight loss of metals during cavitation erosion: During the initial incubation period, micropits are formed on the surface of the metal, with resulting microdeformations. The period of intensified degradation is characterized by selective destruction of crystallites, and the development of an eroded surface. The resistance of the metal to degradation at this stage is determined by the anisotropy and plasticity of the crystallites. In the third period of uniform degradation, breaking and removal of the crystallites from the eroded surface takes place. Measurements of microhardness of tempered steel U7 during the process of cavitation erosion indicated an increase in the temperature of the erosion zones to about 450-500 C.

Metals, cavitation, mechanism, foreign

1961 Met 210
Vol.18 PDL-40013

U.S. Atomic Energy Commission. Office of Technical Information, Oak Ridge, Tenn.
AEC-EURATOM CONFERENCE ON AQUEOUS CORROSION OF REACTOR MATERIALS, BRUSSEL, BELGIUM October 14-17, 1959
TID 7587 (July 1960) 465 p.

Conference, corrosion, metals, water, zirconium alloys, aluminum, aluminum alloys, titanium, uranium alloys, iron alloys, claddings, mechanism, reactors, high temperature

PDL-40372

American Society for Testing Materials, Philadelphia, Pa.
REPORT OF COMMITTEE B-3 ON CORROSION OF NON-FERROUS METALS AND ALLOYS
1961 Preprint 11. (1961) 9 p.

Metals, nonferrous, corrosion, tests, salt spray, standards, specifications

PDL-38063

Gt. Brit. Ministry of Aviation. Technical Information and Library Services
THE CORROSION FATIGUE PROPERTIES OF ALUMINUM ZINC MAGNESIUM ALLOY TO D.T.D. 683
S & T Memo No. 10/60 (May 1960) 7 p.

Corrosion, fatigue, alloying agent, aluminum alloy, zinc, magnesium, tests, surfacements, accelerated, salt spray, coatings(organic), coatings(metallic), corrosionproofing

1961 Misc 83
Vol.18 PDL-39105

Lodge, James P., Jr., A. J. MacDonald, Jr., and Eero Bihman (Robert A. Taft, Sanitary Engineering Center, Cincinnati)

A STUDY OF THE COMPOSITION OF MARINE ATMOSPHERES
Tellus (Sweden) 12:184-187 (May 1960)

Data on trace constituents of air sampled in mid-Pacific at deck level (lat 30°N, long 140°W) during July and August are summarized and discussed briefly. Nitrogen dioxide levels were below 0.1 pphm 94% of the time, with one reading above 0.5 pphm. Only 16% of the samples showed traces of carbon monoxide, and these indicated values below 1.0 ppm. Detectable amounts of sulfur dioxide (more than 0.01 pphm) were found in 42% of the samples, but 91% were below 0.5 pphm; seven of thirty-two values were above 1.0 pphm; with a maximum of 4.6 pphm. The occasional high values of the nitrogen dioxide and carbon monoxide are probably attributable to shipboard contamination. It is uncertain, however, that the sulfur dioxide values are entirely caused by local sources.

Ozone levels ranged from 1 to 7 pphm by the phenolphthalein method and from 0.25 to over 3 pphm by the Brewer-Mast recorder (potassium iodide). No regular diurnal variation was apparent. Rubber cracking determinations were inconclusive. Sulfate levels in particulates were somewhat higher than the chloride; nitrates were an order of magnitude lower. At a mean level of 1.6 μg/cu m, organic compounds were low enough to be attributable to aerosol uptake from a surface monolayer.

Atmosphere, Pacific, marine, analysis

1961 Misc 84
Vol.18 PDL-39814

Taft (Robert A.) Sanitary Engineering Center, Cincinnati (Shih L. Chang, Mark A. McClanahan and Paul W. Kabler)

EFFECT OF BACTERIAL DECOMPOSITION OF HEXADECANOL IN MONOLAYER FILMS ON THE SUPPRESSION OF EVAPORATION LOSS OF WATER

Presentation at the Annual Meeting of the American Chemical Society, New York, N.Y. (September 11-15, 1960) 17 p.

In laboratory tests, monolayer films of hexadecanol and octadecanol on distilled water supported limited growth of Pseudomonas and Flavobacterium sp., the peak population being 1 million/ml. Impairment of the evaporation suppression efficiency of the films seems to be related more closely to isolation of alcohol solids which prevents spreading needed for film repair than to damage to the film. When the solids were completely isolated so that film repair became impossible, the efficiency was lost.

In the absence of an excess of the alcohol needed for film repair, the hexadecanol film formed on a Pseudomonas-laden distilled water without an established surface bacterial population retained its equilibrium pressure about 1 day. On water with well-established surface Pseudomonas population, film stability lasted 1 hr. In the presence of Flavobacterium under similar conditions, film stability persisted a few hours longer. Pending development of effective bacteria controls, film efficiency is best maintained by continuous application of the hexadecanol-octadecanol mixture, even when a surface bacterial population is established.

Alcohol, films, water, bacteria

1961 Misc 85
Vol.18 PDL-39055

Christman, Herbert H. (Douglas Aircraft Co., Inc., Santa Monica, Calif.)
WEATHER-TEST THOR IRSM IN ENVIRONMENTAL CHAMBER
Heating, Piping, Air Conditioning 32:123-127 (June 1960)

At Edwards Rocket Base, Calif., a 20 x 24 x 75 ft high(internal dimensions)chamber is used to test launching procedures in environments simulating any likely to be met in service. Missiles may be captive-fired in controlled ambient temperatures between -35 and +165 F in any conditions of precipitation. The massive and elaborate air conditioning system is described. Work performed includes: (1) determination of heat transfer rates between the controlled ambient and the inside of the inertial guidance components and the engine section; (2) determination of temperature distribution within these areas; (3) evaluation of existing ground support air conditioning; (4) determination of missile temperature transients when air conditioning is interrupted; (5) demonstration of operating capability of airborne hydraulic, mechanical, and electronic equipment; and (6) evaluation of operational problems and hazards of liquid oxygen and fuel loading in extreme environments.

Missiles, test facility, weathering

PDL-39297

Klein, M. and L. Rosenberg (Columbia University, New York, N.Y.)
DETERIORATION OF INVENTORY AND EQUIPMENT
Naval Research Logistics Qtly. 7(1):49-62 (March 1960)

Equipment, storage, service life, mathematics, techniques, sampling, material handling

1961 Misc 86
Vol.18 PDL-40216

U.S. Wright Air Development Center (Helen H. Maxwell)
A REVIEW OF THE AIR FORCE MATERIALS RESEARCH AND DEVELOPMENT PROGRAM
Technical Report 53-373, Supplement 6; ASTIA Doc. 229675 (November 1959) 163 p.

Adhesives, petroleum products, polymers, rubber, elastomers, textiles, ceramics, coatings(metallic), coatings(organic),corrosion, design, electrodeposition, fuels, graphite, hydraulic fluid, grease, lubricants, metals, packaging, sandwich structures, tests, summary, bibliography

PDL-36897

Western Petroleum Refiners Assoc. Tulsa, Okla.
DISTILLATE FUEL STORAGE STABILITY. STUDIES RELATING TO CAUSES OF INSTABILITY
Summary Report 2 (October 1958) 109 p.

Fuels, oils, storage, deposits, contaminants

PDL-38626

Winkel, A.
A NEW METHOD FOR THE MEASUREMENT OF DUST (in German with English summary)
Staub 19:253-255 (July 1959)

Dust, atmosphere, analysis, technique, foreign

PDL-40217

U.S. Snow Ice and Permafrost Research Establishment, Wilmette, Ill.
BIBLIOGRAPHY ON SNOW, ICE AND PERMAFROST WITH ABSTRACTS
SIPRE Report 12, Volume 14 (January 1960) 249 p.

Snow, ice, permafrost, summary, bibliography

1961 Misc 87
Vol.18 PDL-39597

U.S. Office of the Assistant Secretary of Defense. (Supply and Logistics)
STATISTICAL PROCEDURES FOR DETERMINING VALIDITY OF SUPPLIERS' ATTRIBUTED INSPECTION
Quality Control and Reliability Handbook (interim) H 109 (May 1960) 36 p.

Statistics, technique, sampling, procurement, storage, maintenance, quality control, handbook

PDL-39613

Vlodavets, V. V.
CONTEMPORARY METHODS OF BACTERIOLOGICAL INVESTIGATIONS OF THE AIR
J. Microbiol., Epidemiol., Immunobiol. 30(12):51-60 (1959) Translated from Zhur. Mikrobiol., Epidemiol. Immunobiol. 30(12):48-54 (1959)

Bacteria, atmosphere, sampling, tests, techniques, review

PDL-37718

U.S. Office of Naval Research
MATERIALS RESEARCH IN THE NAVY
Symposium ONR-5, Vol. 1; ASTIA Doc. 217822. 375 p.

Materials, research, programs, symposium, Navy

PDL-39636

National Pest Control Assoc. Elizabeth, N.J.
BIRD HAZARD TO AIRCRAFT.
Technical Release 2-61 (February 1961) 8 p.

Pest, birds, biocontrol, airfield, aircraft

1961 Misc 88
Vol.18 PDL-39596

U.S. Office of the Assistant Secretary of Defense (Supply and Logistics)
SAMPLING PROCEDURES AND TABLES FOR LIFE AND RELIABILITY TESTING (BASED ON EXPONENTIAL DISTRIBUTION)
Quality Control and Reliability Handbook (interim) H 108 (April 1960) 74 p.

Statistics, technique, test, sampling, service, reliability

PDL-39765

Jack V. Chambers (U.S. Quartermaster Corps. Quartermaster Research and Engineering Center. Natick, Mass. Environmental Protection Research Division)
CANAL ZONE ANALOGS. X. ANALOGS OF CANAL ZONE CLIMATE IN THE PACIFIC ISLANDS
Technical Report EP-142 (November 1960) 23 p.

Climatology, Canal Zone, Oceania, comparison, maps

PDL-39947

Durr, Albert M., and William R. Meador. (Continental Oil Co.)
GASOLINE COMPOSITIONS
U.S. Pat. 2,922,706; January 26, 1960. 3 p.

Patent, gasoline, depositproofers

PDL-39813

Hoffman, D. P. (General Dynamics Corp. Convair Division)
"FINGERPRINTING" AIRBORNE DUSTS
Air Eng. 2:51-55 (October 1960)

Dust, contaminants, atmosphere, analysis,technique

1961
Vol.18

Pkg 31
PDL-38008

Stanford Research Institute, Menlo Park, Calif.
(Raymond K. Cohen and Michael Nelson)
EVALUATION AND CONTROL OF SWEAT DAMAGE
Project S-2179, Final Report (July 1959) 192 p.

Sweat damage to canned goods shipped by sea from the West Coast is markedly affected by the season of the year; for example, 80% of the damage is on shipments loaded between December and March. Damage claims rose significantly during the period 1952-1957, due probably to increased use of differential tin plate and to buyer's inspection procedures. Laboratory and field studies have analyzed causes, and attempted economic and technical evaluation of possible preventatives. Blocks of canned goods up to a pallet load in size were exposed in an environmental chamber where temperatures and dew points closely simulated conditions in ships' holds. Seven actual shipments were closely observed ashore and at sea in transit from cannery to destination warehouse.

Analysis of environmental histories of sweat damaged, canned goods show little relationship between damage and port of loading, a definite relationship between damage and trade route, some relationship between storage and damage, and no apparent relationship between damage and cargo dehumidification.

Three feasible solutions are offered: (1) application of a corrosion-inhibiting film to the cans before labelling; (2) enclosure of pallet loads in vapor varriers, or shipment in container units; and (3) control of humidity in the hold. Each of these methods has its advantages and limitations, and no one alone may suffice. Choice of method or combination of methods will usually depend on the nature and origin of individual shipments, their route and destination.

Containers, transportation, ships, condensation

1961
Vol.18

Pkg 32
PDL-38069

Stern, R. K. (U. S. Forest Service. Forest Products Laboratory, Madison, Wis.)

SELECTING PACKAGE CUSHIONING

Modern Packaging 33(4):138-145, 197 (December 1959)

An analytical method is described for selecting cushioning materials for specific applications. The method was evolved from dynamic test data in the form of peak deceleration-static stress curves (also presented) on 2 in. thick rubberized hair, rubberized tampico, urethane foam, and glass fiber. Full analysis of all factors and interreactions between factors in cushioning is impracticable. This present method is based on the element of peak deceleration (PD) alone.

To determine the PD that an item can withstand, it is subjected by a shock testing machine to known impacts, initially of low PD, but conforming in time duration and shape to values representative of shipping conditions. Impact severity is gradually increased until the item fails. The PD corresponding to a point just short of failure is taken as the item's fragility value. The test is repeated, directing the applied deceleration parallel to all three major axes. Since like items vary in individual fragility: an average value must be developed or the general rating lowered to provide for the weaker units.However, the ratings must be realistic; too conservative a rating eliminates any chance of selection of optimum cushioning material.

To control the impact shock to an item in fragility testing, the item is either attached rigidly to the movable head of a shock testing machine, or dropped in a cushioned container from progressively greater heights. Accelerometers attached to the item record deceleration. Testing continues until failure. Pulse shape of the input shock automatically conforms to that suffered during shipment. Although arbitrarily limited in basis, the method is a valuable guide to packagers. Illustrative examples are presented.

The question of using empirical or analytical methods to solve cushioning problems is determined primarily by the nature and number of articles to be shipped. Cushioning selection should be supplemented by test drops of the complete package, before package and packaging material are adopted.

Packaging, cushioning, selection, test

PDL-40401

Werner, Anthony, E. A.
THE PRESERVATION OF ARCHIVES
J. Soc. of Archivists (London):1:282-288. (October 1959)

Paper, document, storage, preservation, techniques, review

PDL-39633

U.S. Transportation Corps, Fort Eustis, Va.
THE TRANSPORTATION ENVIRONMENTAL OPERATIONS GROUPS FIVE YEAR PROGRAM
(n.d.) 7 p.

Transportation, extreme environments, military, programs

PDL-40111

Donohoe, L.N.
UF PRESERVATION AND STORAGE PROGRAM AT COAST GUARD AIR STATION, TRAVERSE CITY, MICHIGAN
Engrs.' Digest (U.S. Coast Guard) No. 127:21-24

Storage, aircraft, inactivation, reactivation

1961 Pkg 34
Vol.18 PDL-39042

Roder, H. E., Rudolf Heiss and G. Schricker
PACKAGING MACHINES CAUSE MECHANICAL STRESSES IN FLEXIBLE MATERIALS
Package Eng. 5:70-72, 74-76, 78, 80, 82-83 (August 1960); 92-98 (September 1960)

Part II

In this second part of a three part report, bag machines are discussed from the standpoint of (1) various stresses that bottom folding imposes on flexible packaging materials, (2) keeping stresses at a minimum when the tube is spread out, and (3) bottom creases and the formation of pin holes. For automatic machines, mechanism of bag formation is explained, necessity of proper machine design is emphasized, and the pliability factor of a material is described, including an equation for calculating it. Also included are the individual steps in forming a harmonica closure which consists of four different creasing processes.

Part III PDL-37802

Investigations into the mechanical stresses in flexible packaging materials are discussed. Differentiation is made between two types of stresses in wrapping machines, those using top and bottom closures for cube-shaped objects, and those using twist wrapping features. In considering the latter, the occurence of biaxial stresses is discussed and the need emphasized for low stiffness and high elongation in a material to obtain optimum performance. The authors explain tube forming on form-fill-and-seal machines and show how to achieve uniform stress distribution.

Packaging, containers, stress, processing

1961 Plas 97
Vol.18 PDL-36604

Gt. Brit. Royal Aircraft Establishment, Farnborough
(R. Sinnott)

THE MECHANICAL PROPERTIES OF SYNTHETIC RUBBERS AT ELEVATED TEMPERATURES. PART 2. HYPALON AND POLYACRYLIC RUBBERS

Technical Note. Chem. 1354 (August 1959) 14 p.

Variations in mechanical properties with temperatures up to 200 C and changes with continued exposure at 125, 150, and 175 C were determined for cured samples of compositions based on Hypalon 20, and the polyacrylics Acrylon BA12, Hycar 4021 and Vyram. The tensile properties of all three polyacrylics show similar reaction to rising temperature. At 100 C they retain 40 to 60% of their breaking stress and elongation at 20 C; with further rise in temperature, the loss of properties is relatively slower. With Hypalon the initial drop in tensile strength is much greater, but the comparatively slight change in elongation at break and behavior on aging suggest that this may be due in part to undercure. At higher temperatures Hypalon's tensile properties compare with those of the polyacrylics, hardness and modulus are more affected.

During the first few days of aging at 125 C the breaking elongations of all four compounds fall rapidly to about 100%, but thereafter they are not greatly affected. At 150 C similar changes occur more rapidly; the polyacrylics retain breaking elongation of only 50 to 60% after 7 days; Hypalon, 30% after 4 days. At 175 C the loss of elastic properties is even more rapid; compounds are serviceable only in special applications and for short periods. The polymers tested were designed not only for heat resistance but also for resistance to oils and chemicals at high temperatures; the presence of oils, for example, would modify considerably their behavior on aging.

The general conclusion is that, where comparatively low breaking elongation at elevated temperature in air is acceptable, all four rubbers may be considered serviceable for restricted periods up to 150 C.

Hypalon, acrylic, polymers, mechanical properties, temperature

PDL-36916

Gt. Brit. Royal Aircraft Establishment, Farnborough, (N. C. W. Judd, T. Lloyd, P. McMullen, and E. W. Russell)
THE PERMANENT LOSS OF TENSILE STRENGTH OF GLASS REINFORCED EPOXIDE RESIN LAMINATES UNDER EXTREME AGEING CONDITIONS
Technical Note Chem 1356 (November 1959) 42 p.

A large variety of 10-ply laminates made with glass cloth untreated or treated with different finishes, epoxide and polyester resins, and various curing agents were tested in the laboratory by prolonged exposure to simulated tropical conditions and by boiling in water.

Tensile strength measurements of glass cloth show a wide scatter; Volan treated cloth suffers more damage than the P.704 finished cloth in the presence of water at 60 C after 30 days.

The greatest permanent losses of tensile strength after hot moist storage are sustained by laminates made with amine cured epoxide resins and Volan treated cloth. After boiling, these laminates show a pronounced brittle type of failure.

Smaller losses in tensile strength after 72 hr boiling occur with acid anhydride cured epoxide resins, or when a silane finish replaces the Volan finish. An acid anhydride cured epoxide resin with certain silane finishes gives laminates with high resistance to boiling up to 400 hr. After 72 hr boiling laminates made from Volan treated cloth with polyester resins are stronger than those made with amine cured epoxide resin, even though their initial strengths were inferior.

Laminates made with an amine cured epoxide resin and an aqueous washed glass cloth lose 20% tensile

strength after 72 hr boiling compared with 50% for laminates made with the same resin system and Volan treated cloth. Even on an absolute basis the aqueous washed cloth laminates are superior in a 72-hr boil to those made with Volan treated cloth. An amine curing agent produces a reduction in tensile strength in glass cloth similar to that produced by water alone, suggesting that the basic nature of the amine is not responsible for the reduction in tensile strength.

The results indicate that deterioration depends on the presence of water and on the temperature and time of storage. Amine cured epoxide resin laminates have a higher water absorption and greater reduction in tensile strength than laminates made with acid anhydride curing agent. Polyester laminates, however, have the highest water absorption and yet the permanent strength losses are low. The water absorption alone, therefore, is not responsible for the loss in strength suffered by the amine cured epoxide laminates.

Laminates, glass, epoxy, polyester, polymers, temperature, water, mechanical properties

PDL-40286

U.S. Quartermaster Corps. (J. D. Park, and J. R. Lacher)
RUBBER RESEARCH: THE SYNTHESIS OF UNSATURATED FLUOROCARBONS
Contract DA-19-129-QM-1263, Progress Report Quarterly No. 10 (November 1960 to February 1961) 15 p.

Elastomers, fluorine compound(organic), temperature-proof, oilproof, synthesis, progress report

PDL-40421

SPECIFICATIONS FOR GENUINE PURE CARNAUBA WAX. LATEST REVISION OF SPECIFICATIONS OF AMERICAN WAX IMPORTERS AND REFINERS ASSOCIATION
Soap Chem. Specialties, Blue Book, 1961. 286 p.

Wax, specifications

1961 Plas 100
Vol.18 PDL-38221

Sollott, Gilbert P., and Fred Einberg (U. S. Frankford Arsenal, Philadelphia, Pa. Pitman-Dunn Laboratories)
INVESTIGATION OF HEAT STABILIZERS FOR NITROCELLULOSE FILM
J. Chem. and Eng. Data 4(3):266-272 (July 1959)

A laboratory study was made of the heat stabilizing effects on nitrocellulose film of more than forty organic compounds at 160 F. The influence of the additive on degradation rate was determined by measuring the viscosity decrease of solutions of aging film with time. Decrease reflects both loss of nitrogen dioxide and decrease in chain length.

Most of the additives sooner or later inhibited rapid degradation, but none inhibited the inherent, slow nitrocellulose decomposition. The slow rate of degradation in the presence of a stabilizer tended to be the same regardless of the previous history of the nitrocellulose. Without an additive, previous storage conditions and age were factors in the stability of nitrocellulose at elevated temperature, but stabilizers virtually eliminated these effects. Compounds of relatively strong basicity caused considerable initial degradation probably via base catalysis; to a small degree, this occurred with a good stabilizer such as diphenylamine. N, N-Diphenylformamide and ethyl N-ethylcarbanilate, compounds used as nitrocellulose propellant stabilizers, had little or no stabilizing effect on film.

Heat stabilizers for film listed in decreasing order of effectiveness when used in 1% concentration are: o-and p-methoxyphenol, o- and p-phenylphenol, N-nitrosodiphenylamine, 2-nitrodiphenylamine, ethyl carbanilate, vanillin, p-tert-butylphenol, eugenol, p,p'-biphenol, triphenylamine, acetanilide, N,N'-diphenylbenzidine, 1,3-dimethyl-1, 3-diphenylurea, 1,3-diethyl-1,3-diphenylurea, 1,1-diphenylurea, diphenylamine, resorcinol, 2,5-di-tert-butylhydroquinone, and carbazole.

As a class the substituted phenols are at least as

effective as aromatic nitrogen-containing stabilizers. The effectiveness of 2,5-di-tert-butylhydroquinone is attributed to radical chain inhibition. In moderate amounts, the best heat stabilizers are weakly basic, neutral, or weakly acidic compounds combining high capacity for nitration with good free radical inhibition. An effective heat stabilizer prevents rapid degradation at high temperature (permitting or causing no more than a minimum initial, rapid degradation), despite inability to inhibit the inherent slow nitrocellulose decomposition. Slight initial degradation of fresh nitrocellulose is minor compared with the stabilizing potential of a moderate amount of stabilizer.

Nitrocellulose, film, heatproofers

PDL-38239

Ezrin, Myer, and Stuart H. Rider(Monsanto Chemical Co.)
EFFECT OF VOLATILE AND MOISTURE CONTENT ON ELECTRICAL PROPERTIES OF PHENOLIC RESIN PAPER LAMINATES
Tappi 43:374-379 (April 1960)

A laboratory study was made of the dielectric properties of variously prepared and treated cresol-formaldehyde and aniline-modified cresol-formaldehyde bonded laminates. Absorption of small amounts of moisture by resin-treated paper before lamination is the prime determinant of the 60-cycle dielectric properties of the laminate. This absorption has much greater effect than a comparable amount of water released as water of condensation on curing the resin.

Measurement of the dielectric properties of resin-impregnated paper and of unimpregnated paper as a function of absorbed moisture content in the uncured, oven cured, and press cured states indicate that the large dissipation increase caused by absorption reflects association between absorbed water and cellulose during press curing. On the other hand, condensation water released on curing is associated primarily with the resin, thus moderating its effect on electrical properties.

Deterioration
NRC

Light pretreatment of the paper (7-9% by wt of paper) with a low molecular weight melamine- or phenol-formaldehyde resin (before normal impregnation) substantially prevents moisture absorption by the paper. Such pretreatment also improves laminate electrical properties at frequencies other than 60 cycles, particularly after water immersion. The melamine resin pretreatment also improved fire resistance.

Laminates, paper, phenolics, polymers, water content, electrical properties PDL-39099

Greenfeld, Sidney H.
CHARACTERISTICS OF FIFTEEN COATING-GRADE ASPHALTS
Natl. Bur. Standards (U.S.) J. Research 64C:299-305 (October/December 1960)

Test data tabulated and discussed show that although suitable processing had rendered all fifteen coating grade asphalts similar in terms of characteristics by which they are normally specified, accelerated weathering revealed 25 to 150-day variation in durability in the 51-9 C cycle. No quantitative correlation is seen between durability and any of the measured characteristics, but there are groupings of the more and less durable asphalts based on specific gravity, flash point, and carbon plus hydrogen, sulfur, asphaltene and resin contents.

Asphalts, roofing, weathering, accelerated, tests

PDL- 36678

Morris, W. E. and J. M. Verdi (Allied Chemical Corp. Edgewater, N.J.)
A STUDY OF CURL IN DECORATIVE LAMINATES
Tappi 42:583-587 (July 1959)

Laminates, phenolics, melamine, polymers, shrinkage, humidity

1961 Plas 103
Vol.18 PDL-39221

U.S. Naval Civil Engineering Laboratory, Port Hueneme, Calif. (R. J. Zablodil, and H. R. Joerding)
TEFLON AS A METAL PRESERVATIVE
Technical Report 095;...ASTIA Doc. 246252 (October 1960) 11 p.

A jeep, with virtually all external and internal surfaces coated to approximately 0.7 mil with Teflon and charged with normal lubricants, was railed 3000 miles and stored outdoors at Port Hueneme, Calif., 700 ft from the ocean. Prevailing off-sea winds occasionally carried spray to the site. Temperature averaged 62 F; relative humidity 70%. After 12 mo the jeep was completely dismantled and all parts inspected. Reassembled without interference with the Teflon coating, it was driven for 4 hr up to 25 mph before return to storage. After a further 10-mo exposure and a second inspection, it was driven 5 miles.

Teflon is considered unsatisfactory as a preservative for exposed or semi-exposed areas in a marine atmosphere. Directly exposed film began to break down after 3 mo; undersides within 6-10 mo. Outer surface of the hood was 50% rusted after 12 mo. Unexposed parts remained well preserved. After the second exposure, internal working surfaces apparently bared by the 4-hr drive (and normally prone to rusting) remained in excellent condition. Teflon's extremely low coefficient of friction and other surface qualities enabled nuts to work loose in rail transit, caused initially poor piston ring seal (with difficult initial starting, and excessive blow-by for a time), and resulted in malfunction in brake master and wheel-cylinders. Engine cylinder wall and combustion chamber films remained intact throughout. Infrared spectrophotometry of the crankcase oil showed no Teflon or rust.

Apart from brake cylinders and drums, and the tendency of threaded assemblies to loosen by vibration, the coating is recommended for internal surfaces in any atmosphere.

Coating(organic),Teflon,metals,weathering,marine,automobile

Deterioration

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1961 Plas 104
Vol.18 PDL-39334

Epshtein, V. G., and Z. V. Chernykh
A STUDY OF BOND PROPERTIES IN THE SYSTEM RUBBER-CARBON BLACK (in Russian with English summary)
Kolloid. Zhur. 21:754-761 (November-December 1959)

Vulcanizates of SKS and SKS-30A synthetic noncrystallizing rubbers were filled with three types of carbon black (chimney black, lamp black, and gas black) in amounts from 20 to 100 phr. Samples 10 mm wide, 2 mm thick, and 40 mm long, were subjected to repeated elongation-relaxation cycles at temperatures from 20 to 100 C. After each deformation cycle, determinations were made of the modulus of elasticity, M (at 100% elongation).

The changes (decrease) of M after repeated deformation cycles depended on the type of rubber, the type and amount of carbon black, and the temperature. Decrease in M was generally greater for SKS-30A than for SKS rubber vulcanizates. At equal temperatures and carbon black contents, decrease was greatest for rubbers filled with lamp black, and smallest for rubbers filled with chimney black. The magnitude of M reduction increased with carbon black content. The highest reduction occurred after the first deformation cycle. Stress-elongation curves after the second deformation cycle differed from the curves of unstressed vulcanizates; they were s-shaped and resembled the curves of crystallizing rubbers. At low carbon black contents, an increase in temperature caused a relatively small reduction or M; with high carbon black, the effect of temperature was more pronounced. At 20 phr, an increase in temperature caused a slight increase of M after repeated deformations; at high carbon black contents this effect was absent, M decreasing with each deformation cycle. Effect of carbon black content on M at 100 C was similar to that at 20 C.

The observed changes in M are determined essentially by the interaction between rubber and carbon black. They reflect better than changes in tensile strength

which depends on other factors as well) the reinforcing action of carbon black. Since changes of M with increasing temperature depend on the nature of the rubber as well as on the nature and amount of carbon black, measurements of M at various temperatures gives a means of evaluating the interaction between rubber and filler.

Mechanical deformation and heating apparently result in desorption of rubber molecules from the surface of carbon black, i.e., in a reduction of the number of bonds between rubber and carbon black. The fact that M decreases with increasing carbon black content in a nonlinear manner indicates that the decrease is determined not only by the specific surface of the carbon black, but also by the formation of carbon black structures(presumably branched chain forms). The fact that mechanical deformation causes a greater reduction of M than an increase in temperature can be attributed to steric hindrance of desorption during heating by these structures. The carbon black-rubber bonds appear to be heat resistant as compared with crystallites of natural rubber; for example, the M of crystallizing rubbers is affected more by temperature than by mechanical deformation.

Elastomers, fillers, carbon black, structure, foreign

PDL-39086

ORGANOTIN ELASTOMERS. HIGH TEMPERATURE RESISTANCE POSSIBILITIES
Rubber J. and Intern. Plastics 139:11-12 (July 1960)

Tin compounds(organic), polymer(inorganic), synthesis, elastomer(inorganic), temperatureproof, methacrylic acid

1961 Plas 108
Vol.18 PDL-39915

Heidacher, J. W. (Studebaker-Packard Corp.)
APPLICATION OF GLASS REINFORCED POLYESTERS TO LARGE STRUCTURES
SPE J. 17:237-239 (March 1961)

Glass reinforced plastics are in service in cooling towers and submarine superstructures. Plastic frames of water intake screens in steam power stations show no deterioration after 2 yr in highly aerated seawater at 2 to 7 fps. Barnacles and other marine life cling as to metals, but without apparent deleterious effect. Stress levels vary with weather and partial clogging of the screen. The 1010 Everdur bronze screen wire shows corrosion/erosion as heavy as 0.047 in./yr.

Optimum mechanical properties in reinforced structures cannot be attained without correct fiber orientation during buildup, requiring use of fairly elaborate molding equipment. Modification of lay-up increased basic tensile strength from 90,000 to 150,000 psi. Structural design exploits tensile properties and minizes stresses in compression.

Welded mild steel fabrication costs much less than glass reinforced plastic; 70% by wt less plastic is required for the same structure. For noncorrosive environments, design stresses for standard plastic members can be 20,000 psi (generally similar to those for steel). The plastic compares favorably in every major property but modulus of elasticity. Accumulated data indicate at least 400% longer service life. In brackish water, which seriously reduces strength and fatigue limit of metals, reinforced plastic members with a density of 0.0615 lb/cu in. can handle design loads of 30,000 psi, whereas design capacity of carbon steel with a density of 0.284 lb/cu in. under constant load falls to 6000 to 8000 psi, requiring approximately 8 times as much material. Joints in large plastic structures may require high-strength corrosion-resistant bolts; these are expensive, but often cheaper than welding. One-piece molding can often eliminate fasten-

ers. Prices of Monel and reinforced plastics are comparable.

Polyesters, polymers, glass, reinforcement, structures, underwater

PDL-39942

U.S. Picatinny Arsenal, Dover, N.J. Feltman Research Laboratories (John J. Veliky, Raymond F. Wegman, Eileen R. Swick, and Michael J. Bodnar)
ADHESIVE BONDING OF METALS FOR ADVANCED ORDNANCE APPLICATIONS
FRL-TR-8; ASTIA Doc. 244377 (September 1960) 17 p.

Six common thermosetting polymers were evaluated as metal adhesives. Stainless steel and titanium were pretreated by 15-min immersion in concentrated chromic acid solution at 120 F. Beryllium surfaces were sanded. Uranium 238 surfaces were sanded to white metal in a pool of adhesive. Uranium and beryllium were bonded to cold-rolled steel; other metals were bonded to themselves. Bond strengths at -65, +73, and +160 F were determined at a loading rate of 600 to 700 psi/min as per FTMS 175-1011.

Styrene-unsaturated polyester and epoxy types adhere reasonably well to stainless steel, beryllium, titanium, gold, silver, and chromium. In general, an internally plasticized epoxy such as a polysulfide-modified epoxy is stronger at -65 F; the more heat-resistant polyesters are preferable at 160 F. Polyamide-epoxies and polyurethanes effect relatively good bonds to uranium; strength loss is inconsiderable after 4 wk at 160 F or 1 yr at 25 to 90 F. Filled epoxylated novolac effects bonds of >6000 psi tensile to beryllium, gold, and chromium. With most of the metals, polysulfide-epoxy bond strength is materially improved by use of a suitable filled epoxylated novolac adhesive. The polysulfide modifier prevents high-strength bonds to silver.

For structural applications, the high-temperature curing adhesives generally are preferred. In applying these basic data, environmental conditions such as temperature, humidity, and types of stress must be

considered. Surface pretreatments merit investigation.

Adhesives, stainless, titanium, beryllium, gold, silver, chromium, uranium

PDL-40087

Leunig, C. V. (General Electric Co.)
DESIGN POLYCARBONATE PARTS THIS WAY
Product Eng. 32(18):46-50 (May 1961)

Mechanical, physical, thermal, design, and fabrication characteristics of Lexan polycarbonate thermoplastics are presented. The tough, rigid materials with metal-like ductility withstand high stresses in tension, and compression and also occasional heavy impact stresses. They tend to creep under prolonged heavy loading and to fatigue failure under high-frequency impact; cold flow occurs above 20% ultimate tensile stress. Brittleness develops at -215 F. The resins are highly transparent, but subject to crazing by combination of tensile stress, heat, and moisture or solvent vapors. They may be glass-reinforced, either as filled moldings or by cloth lamination.

Normal thermoplastic forming techniques are applicable, but cold working methods such as rolling, hammer forging, coining, stamping, deep-drawing, and die bending also are practical. Working ductility is comparable with that of half-hard sheet brass; spring-back is 5 to 6%. Rod stock, up to 1/8 in. diameter, can be cold-headed by metal riveting techniques. Tube may be flared or joined with pipe threads. The materials are joined by solvent-cementing, welding, adhesives of many types, or mechanical fasteners including self-tapping screws.

Polycarbonates, polymers, review

1961 Plas 111
Vol.18 PDL-38312

U.S. Army Chemical Warfare Laboratories, Army Chemical Center, Md. (Arthur Lyem)
SIXTH MATERIALS REVIEW
CWL Special Publication 4-11; ASTIA Doc. 229919 (November 1959) 92 p.

Research, programs, summary, bibliography, polymers, textiles

PDL-40003

Gt. Brit. Ministry of Aviation
REPORTS ON PLASTICS IN THE TROPICS. 12. POLYVINYL CHLORIDE
(1960) 56 p.

Thirteen batches of plasticized and four of unplasticized sheets of various commercial grades of poly(vinyl chloride) (PVC) and related materials, and specimens of PVC covered electric cable were exposed outdoors for 2 yr at seashore, jungle and desert sites in Nigeria.

Dust and biological growth caused much staining of sheet at jungle sites; in desert sites, plasticizer exuded and surfaces were covered with brown dust. Brass inserts corroded, but only in the batch plasticized with di-octyl sebacate was the corrosion persistent; staining of sheets by this corrosion occurred in seven batches.

At the three humid sites, five batches lost and two gained weight. Changes in dimensions of unplasticized batches were small at all sites. Three batches at humid sites and one at the dry site gained tensile strength; most other specimens lost strength. The small changes in electrical properties might be associated with surface damage.

Cable insulation remained in good condition over the full range of tropical factors, including high humidity and strong sunlight. There was negligible physical damage other than by termites; with one exception, insulation resistance remained good. High

tension cable used in the ignition system of a motor vehicle remained excellent after 33 mo; apart from slight abrasion, there was no sign of deterioration and electrical properties remained constant.

Vinyl chloride, polymers, electric insulation, weathering, jungle, desert, marine

PDL-39295

Kennedy, J. P., and C. M. Fontana (Celanese Corp. of America, Summit, N.J.)
THE THERMAL DEGRADATION OF POLYACRYLONITRILE
J. Polymer Sci. 39:501-506 (September 1959)

Polymer, acrylonitrile, temperature, decomposition, mechanism

PDL-38346

Tobolsky, A. F. and A. Mercurio (Princeton University)
OXIDATIVE DEGRADATION OF POLYDIENE VULCANIZATES
J. Applied Polymer Sci. 2:186-188 (1959)

Rubber, butadiene, elastomers, oxidation, temperature, mechanism

PDL-39995

Blomquist, Richard F. (U. S. Forest Service. Forest Products Laboratory, Madison, Wis.)
PROGRESS IN 1960...GLUES AND GLUING PROCESSES
Forest Products J. 11:77-85 (February 1961)

Adhesives, wood, review, bibliography

PDL-36680

Osborn, K. R. (E. I. DuPont de Nemours and Co., Inc.)
THE PHOTOLYSIS OF POLYETHYLENE TEREPHTHALATE
J. Polymer Sci. 38:357-367 (August 1959)

Polymers, polyethylene terephthalate, decomposition, light

1961 Plas 113
Vol.18 PDL-36348

Cunneen, J. I., and F. W. Shipley (British Rubber Producers' Research Assoc., Welwyn Garden City, Eng.)
CIS-TRANS ISOMERIZATION IN POLYISOPRENES. PART I. IMPROVEMENT OF THE LOW TEMPERATURE PROPERTIES OF NATURAL RUBBER BY REACTION WITH THIOL ACIDS IN SOLUTION AND IN LATEX
J. Polymer Sci. 36:77-90 (April 1959)

Rubber, temperatureproofing, chemutation

PDL-38921

Hunter, B. A., A. C. Nawakowski, R. R. Barnhart, E. M. Campbell and E. B. Hansen (United States Rubber Co.|Naugatuck|Chemical Div.)
STYRENE-BUTADIENE RUBBER (SBR): IMPORTANT STABILITY FACTORS
Trans. Inst. Rubber Ind. 35:121-143 (August 1959)

Styrene-butadiene, elastomers, oxidationproofer

PDL-35774

McMahon, William, H. A. Birdsall, G. R. Johnson, and C. T. Camilli (Bell Telephone System, New York, N.Y.)
DEGRADATION STUDIES OF POLYETHYLENE TEREPHTHALATE
J. Chem. and Eng. Data 4:57-79 (January 1959)

Dacron, Mylar, decomposition, mechanical properties, temperature, humidity

PDL-40018

U.S. Forest Service. Forest Products Laboratory, Madison, Wis.
LIST OF PUBLICATIONS ON GLUE, GLUED PRODUCTS, AND VENEER
Report 513 (May 1960) 27 p.
Adhesives, wood, metals, bibliography

1961 Plas 114
Vol.18 PDL-37408

Dubois, P.
RESEARCH PROBLEMS AND RESULTS ON THE BEHAVIOUR OF PLASTICS EXPOSED TO AGEING (in German with English summary)
Kunststoffe 49:632-645 (November 1959)

Polymers, tests, accelerated, aging, weathering, foreign

PDL-37463

Miller, F. H.
PERMANENT PHYSICAL CHANGES IN HIGH-POLYMER MATERIALS AND METHODS OF TEST (in German with English summary)
Kunststoffe 49:609-615 (November 1959)

Polymers, physical properties, processing, tests, foreign

PDL-36343

Smith, Frank B. (United States Rubber Co., Naugatuck Chemical Division)
COMPARATIVE PERFORMANCE OF ANTIOZONANTS IN ROAD AND ACCELERATED TESTS IN THE LOS ANGELES AREA
Rubber World 141:383-391 (December 1959)

Elastomers, rubber, nylon, styrene-butadiene, tires, ozoneproofers, tests, accelerated

PDL-40373

American Society for Testing Materials, Philadelphia, Pa.
REPORT OF COMMITTEE C-19 ON STRUCTURAL SANDWICH CONSTRUCTIONS
1961 Preprint 30 (1961) 10 p.

Sandwich, physical properties, mechanical properties, creep, aging, tests, specification

1961 Text 69
Vol.18 PDL-39173

Bykov, A. N., and S. S. Frolov
MODIFICATION OF PROPERTIES OF CELLULOSE MATERIALS ON FREEZING (in Russian)
Khim. Volokna No. 3:33-37 (1960)

The effect of freezing in water or in 5 to 20% alkali solutions at -21 and -75 C on the molecular structure of bleached cotton fibers and viscose rayon fibers was studied.

Freezing caused a reduction of the degree of polymerization and viscosity of cellulose, and increased its reactivity as evidenced by increased absorption of iodine and dyes. The degree of cellulose degradation was generally higher on freezing at -75 C than at -21 C. In solutions of alkali, particularly at higher alkali concentrations, the decrease in viscosity and in degree of polymerization was smaller than in water. This can be explained by the swelling of cellulose in alkali, leading to a weakening of intermolecular bonds, and hence to a lesser susceptibility to the disrupting action of ice. The reactivity of cellulose frozen in alkali was greater than that of cellulose frozen in water. Rayon fibers showed less structural changes than native cellulose fibers, apparently because of their initially weaker intermolecular bonds. Repeated freezing and thawing reduced the tensile strength of rayon fibers, but the relative loss of tensile strength decreased with each freezing-thawing cycle.

Textiles, cotton, rayon, freezing, foreign

PDL-38919

Legkun, J.A.
LIGHT ABSORPTION OF DYED FABRICS EXPOSED TO SUNLIGHT PARTS I AND II (in Polish)
Przeglad Wlokienniczy 12:548-551; 596-600 (1958)

Textiles, dyes, light, mechanical properties

1961
Vol.18

Text 70
PDL-40063

American Cyanamid Co., New York, N.Y.
THE PRODUCTION OF SYNTHETIC AND PROTEINACEOUS TEXTILE FABRICS HAVING ANTIBACTERIAL PROPERTIES
Gt. Brit. Pat. Spec. 842,217; July 20, 1960. 4 p.

Neomycin imparts to synthetic and proteinaceous textile fabrics a stable, nontoxic, nonallergenic antibacterial finish which withstands elevated temperatures, laundering, and dry cleaning. Treatment does not impair dyeing qualities or hand. Cellulose acetates and similar artificial materials are not treatable. Neomycin sulfate is most commonly used but other salts also are suitable. Neomycin contents as low as 0.0001% by wt of fabric are effective; preferred range is 0.01 to 1%. It is readily absorbed on the material by padding, exhausting, or spraying; exhaustion takes from 5 to 60 min. The fabric is rinsed, and dried at 70 to 350 F.

Textiles, bacteria, toxic, antibiotic, patent

PDL-40370

U.S. Quartermaster Corps. Quartermaster Research and Engineering Center, Natick, Mass. Textile, Clothing and Footwear Division (Carlo G. DeMarco, Gil M. Dias, and William F. Smith)
"QUARPEL" WATER- AND OIL-RESISTANT TREATMENT FOR TEXTILES
Textile Series No. 111 (April 1960) 20 p.

Textiles, waterproofing, oilproofing, fluorocarbons, pyridinium compounds, clothing

1961 Text 71
Vol.18 PDL-39172

Nechaeva, S. A., Yu. M. Malinskii, and Z. A. Rogovin
INCREASE IN THERMAL STABILITY OF POLYOEFIN FIBERS BY IONIZING RADIATIONS (in Russian)
Khim. Volonkna No. 3:7-9 (1960)

Vacuum-stretched polypropylene and polyethylene fibers were irradiated with gamma rays from a cobalt-60 source in doses of 0.7 to 0.8 megarad/hr. The heat resistance of the irradiated fibers was evaluated by measuring their shrinkage at high temperatures, and their tensile strength and elongation at break. Low total doses of radiation (up to 30 megarad) caused no improvement in these properties. Low doses even increased the shrinkage at high temperature of polypropylene, apparently as a result of partial degradation of the polymer. Somewhat better results were obtained with total doses of 150 megarad. With this amount polypropylene fibers did not shrink at all at 90 C, and at 110 to 130 C shrinkage was only 25 to 30% of that of nonirradiated fibers. The mechanical strength of the fibers, however, was considerably reduced (up to 50% as compared with nonirradiated fibers.) Irradiation of high-pressure polyisobutylene-plasticized polyethylene fibers with a dose of 150 megarad eliminated their softening at high temperature (100 to 120 C), but reduced the loss of mechanical strength on heating only insignificantly.

Polypropylene, polyethylene, high energy, high temperature, shrinkage, mechanical properties, fibers, foreign

PDL-40222

Brooklyn. Polytechnic Institute, (F. R. Eirich and L. A. Rajbenbach)
IMPROVEMENT OF THERMAL STABILITY OF TEXTILE FIBERS
Progress Report 1; (July-September 1959) ASTIA Doc. 235903. 13 p.

Textiles, fibers, temperatureproofing, nylon, polymer acrylonitrile, process, progress report

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Text 72
PDL-40309

Whitfield, Robert E. (U. S. Agricultural Research Service. Western Regional Research Laboratory, Albany, Calif.)

TREATMENT OF WOOL WITH CHLOROSULFONATED POLYETHYLENE
Textile Research J. 31:446-451 (May 1961)

Polymers of chlorosulfonated polyethylene can be grafted on wool by curing at 130 to 150 C for 6 to 24 hr. At longer times and higher temperatures, percent grafted may be as high as 90%; under milder conditions of cure, only 1 to 2%. Although deposition on the wool without grafting at uptakes of 8% or higher imparts good resistance to shrinkage, durability of the resin finish to laundering, and good resistance to aqueous solvents, grafting is necessary to give durability of the treatment to dry cleaning. The process also affords the desired properties at lower resin uptakes. The treated fabric is not significantly altered in hand, wrinkle recovery, abrasion, tear strength or color. It shows a somewhat greater tendency to soil as revealed by carbon black tests.

Wool, chemutation, shrinkproofing

PDL-40626

"ORGANO-TIN COMPOUNDS AS TEXTILE PRESERVATIVES"
Tin and its Uses No. 45:8-9 (Winter 1958)

Wool, fungi, insects, toxics, tin compounds(organic)

1961 Wood 97
Vol.18 PDL-40301

U. S. Forest Service. Forest Products Laboratory,
Madison, Wis. (Earl Rogers Schafer)
EFFECT OF CONDITION AND KIND OF WOOD ON GROUNDWOOD PULP QUALITY
Report 2220 (April 1961) 7 p.

Nearly all physical properties of wood may affect the quality of groundwood pulp made from it. Low density woods yield stronger and longer fibered pulps. Compression wood which breaks into small fragments relatively easily can cause lower pulp yields, low pulp strength and pulp bleaching difficulties. It contains little or no lignin and more cellulose than normal wood. Tension wood, characterized by a greater lignin and a lower cellulose content than normal woods, may or may not be detrimental to pulp quality.

Heartwood affects color and brightness of the pulp and may cause pitch trouble because of its resin and gum content. Bleaching may counteract the former and chemicals the latter difficulty. The effect of decay is not consistent. Brown rot, which attacks cellulose principally, causes lowered pulp strength. White rot, which attacks lignin, may improve groundwood quality in early stages but later decreases pulp strength. In aspen tests, decay affected brightness appreciably, bursting and tearing strengths slightly; average fiber length of the pulp was affected in inverse proportions to amount of decay present. Decay had little or no effect on tensile strength.

Changes in pulp quality with storage time of pulpwood are nonpredictable Losses in strength properties of pulp produced from rough and peeled wood are steady throughout storage. There is little difference in the two kinds of wood despite the fact that decay is greater in the rough than peeled wood. Tensile strength and breaking length values are less affected by storage than bursting strength and tear resistance. Standing dead timber may produce good groundwood pulp, differences depend on causes of death and subsequent destructive agents. Wood killed by insects or fire (with no charring or charred portions removed) may be

salvaged. Freshly cut wood is preferred over seasoned wood which generally yields a shorter fibered pulp with an inferior color. Rewetting of dried wood does not generally give the same quality of groundwood pulp as the original greenwood.

More than 80% of the pulpwood used in the United States for groundwood pulping consists of softwood-mostly black and white spruce, balsam fir, weatern hemlock and southern pine. Hardwood used is 95% aspen. Groundwood pulping characteristics of softwood and hardwoods are discussed and typical data on the ground wood pulps obtained from a number of domestic and foreign species are given.

Wood, pulp, storage, decay, review

PDL-39406

Jain, J. C., and A. Lagus (Helsinki. State Institute for Technical Research)
STUDIES ON THE FIXATION OF WOOD PRESERVATIVES IN TIMBER
J. Timber Dryers' and Preservers' Assoc. of India 6(4): 10-17 (October 1960)

The preservatives, Lahontuho (34.2 to 36.5% As_2O_5, 13.9 to 15.7% CuO and 26.6 to 28.9% CrO_3); Wolmanit - UAR; Tancas-C; Celcure type composition (50% $CuSO_4$, 48% $Na_2Cr_2O_7$ and 2% CrO_3); K-P (copper pentachlorophenoxide in ammoniacal solution) were studied for their comparative fixation in Pinus sylvestris. In addition, two preparations from India, Ascu As_2O_5, $CuSO_4$, $Na_2Cr_2O_7$) and 'Fire proof cum antiseptic' ($CuSO_4$, H_3BO_3, $ZnCl_2$, $Na_2Cr_2O_7$ in a ratio of 1:3:5:6) were studied for fixation in other timbers.

To 5-gm samples of pine dust, 10 ml aqueous solutions of the above preservatives were added, the samples were air dried, and leached with 800 ml water after 1,5,12 and 21 days. Solutions were added in 1% concentration except for K-P at 0.45%, Ascu 2%, and 'Fire proof cum antiseptic' composition at 3%. The recovered saw dust was chemically analyzed for the quantity of preservative retained.

Deterioration
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Of the preservatives containing arsenic, copper and chromium, Ascu gave a better overall performance than Tancas-C or Lahontuho. Arsenic was 99% fixed in Ascu and Tancas-C, 80% in Lahontuho. Fixation of chromium improved during the period of air dyring and reached a maximum of 97% in all three compounds. Total salts fixed reached a maximum after 21 days of 95% for Ascu and Tancas-C and 85% for Lahontuho.

With K-P preservative 24% CuO was leached after 1 day of air drying, and the fixation did not improve after 21 days. In the Celcure type composition the preservative was fixed satisfactorily in 12 days air drying with only 3% copper and 4% chromium oxides leached. Copper was fixed to a greater extent with this preservative (96%), than with all others reported. Wolmanit-UAR, even after 21 days air-drying, lost more than 15% arsenic and 20% chromium oxides. The arsenic fixation was better than for Lahontuho. After 21 days of air-drying, 33.5% total salts were leached from 'Fire proof cum antiseptic'. Copper and chromium oxides were almost completely fixed, but 55% zinc chloride was lost.

Wood, toxics, pine, persistence, copper compounds, arsenic compounds, zinc compounds, chromium compounds

PDL-40303

U.S. Forest Service. Forest Products Laboratory, Madison, Wisc. (J. W. Clark)
DECAY RESISTANCE OF EXPERIMENTAL AND COMMERCIAL PARTICLE BOARD
Report 2196 (August 1960) 10 p.

Soil block tests on particle board were run to determine the effect of wood species, type and percentage of binder, particle type and degree of compression. Laboratory made particle boards were of Douglas-fir; commercial boards were of various woods. Tests were run for 12 wk with Poria monticola and Lenzites trabea using southern pine feeder strips. Boards were grouped into four decay classes with respect to weight losses. Inclusion of 1% wax in a urea-formaldehyde

bonded Douglas-fir panel gave no significant improvement in decay resistance. Increasing the amount of urea-formaldehyde binder from 4 to 8% was markedly beneficial. Increasing the amount of phenolic binder from 3 to 6% increased specific gravity of the board from 0.53 to 0.66 but appeared to have no effect on decay resistance. The specific gravity of the experimental panels reflects primarily differences in degree of compression. In urea-formaldehyde bonded panels, moderately greater resistance was associated with lower density board. Rather wide difference in decay resistance between commercial products could not be accounted for because of insufficient information about composition of the panels.

Visual inspection showed a wide range of delamination, as well as swelling. To what extent decay organisms modify the degree of delamination was not determined. However, severe delamination was not necessarily associated with high weight loss nor was lack of delamination closely correlated with low weight loss.

Fiberboard, wood, fungi

PDL-37646

Architectural Woodwork Institute, Chicago, Ill.
ARCHITECTURAL WOODWORK, 1960. PRESERVATIVE TREATMENT OF MILLWORK
Publication 13 (n.d.) 8 p.

Wood preservation resolves itself into attainment of one or more of the following objectives: (1) keep wood dry at all times, (2) use the heartwood of a species with a high, natural resistance to decay, or (3) treat the wood to immunize it against decay causing elements.

Dry lumber should be specified for achitectural woodwork and its installation should take place under controlled, favorable conditions. Construction design should prevent rain seepage into joints or provide for escape if seepage occurs. When used under conditions forming decay, lumber, unless clear and of heart-grade, should be given a preservative, water repellent treat-

ment with chemicals toxic to insects or fungi, such as chlorinated phenols, e.g., pentachlorophenol, and water repellent ingredients carried in volatile petroleum carriers. This treatment will not swell, distort or roughen the wood, and will not require re-kiln, drying or interfere with subsequent painting or finishing. The water repelling feature reduces moisture absorbing qualities of the wood (thus reducing chance of decay), increases dimensional stability, and minimizes moisture-induced blistering and peeling of paints. The 3-min dip or immersion method, with subsequent redipping or brushing of the same solution on trimmed or cut edges, is sufficient. Pressure treatments increase penetration and retention but reduce paintability. Water-borne preservatives such as Tanalith or Wolman salts impart no water repellency and cause degrade and processing problems.

Wood, toxics, millwork, waterproofers, review

PDL-40367

SULPHUR DIOXIDE POLLUTION OF THE ATMOSPHERE
J. Soc. of Archivists (London) 1:291-293 (October 1959)

Test papers (1 x 5 cm) impregnated with cobalt oxide (Co_2O_3) were designed to bleach from the original mottled dark brown color according to the amount of sulfur dioxide in the air. In a normal industrial atmosphere complete change occurred in 1 wk, in highly polluted atmospheres in 48 hr. In dry atmosphere slips changed to green, in humid atmosphere to white Exposure of slips was in record rooms and offices.

Complete protection from sulfur dioxide in the air may be obtained by air conditioning. Where this is not possible, virtually complete safety can be provided by boxing, and since air circulation to deter mold growth must be provided, loosely fitting lids should be used and the documents should be unwrapped. This moderate degree of enclosure gives adequate protection from air pollution even under conditions of high acidity. Books and other items which cannot be boxed can be loosely wrapped or tops and fore-edges of the leaves protected.

Sulfur, contaminants, atmosphere, indicator, documents, storage

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1961 Wood 102
Vol.18 PDL-40323

Lederer, S. J. and W. J. Delaney (Metalsalts Corp. Hawthorne, N.J.)
INCREASED SLIMICIDAL EFFICIENCY WITH NEW MERCURIAL COMPLEXES
Pulp and Paper Mag. Can. 61:T250 (April 1960)

D-propionate (diphenylmercury)ammonium propionate and PMA (phenylmercury acetate) were used as slime control agents under identical conditions in the same fine paper mill machine. Initially, PMA was added to the beaters continously at 0.9 oz/ton of pulp. PMA was then replaced by D-propionate added in the same manner at 0.7 oz/ton. Slime accumulations which had increased during PMA treatment decreased markedly after the first 36 hr of D-propionate addition. Microbiological assays showed considerable decrease in microbial populations after 24 hr D-propionate treatment. D-propionate retained its effectiveness under conditions where the phenylmercurials were markedly inhibited. After 16 mo use, no incident of growth of "resistant" organisms were found. The increase in slimicidal activity by conversion of the phenylmercury group to the quaternized complex is undoubtedly coupled with the change in chemical and physical properties as well as the increased biological activity.

Slime, toxic, phenylmercury compounds, quaternaries, mercury compounds(organic), comparison, pulp

PDL-40224

U.S. Dept. of Agriculture. Rural Electrification Administration
SPECIFICATION NO. T-4 COVERING WOOD POLETYPE CROSS-ARMS (AND PRESERVATIVE TREATMENT) TO BE PURCHASED BY REA ELECTRIFICATION BORROWERS
REA BULLETIN 44-9 (December 1960) 7 p.

Wood, poles, specifications, toxics, pentachlorophenol, creosote

1961 Wood 103
Vol.18 PDL-37801

Brown, G. E., and H. M. Alden (Monsanto Chemical Co.)
PENTA FOR PARTICLE BOARD
Forest Products J. 10:434-438 (September 1960)

Particle boards were prepared in the laboratory and commercially under standard conditions; one set was bonded with a urea-formaldehyde resin and one set with phenolic resin. Various percentages of sodium pentachlorophenoxide were added to the resin before it was sprayed on chips. Interim results of exposure in Florida tests plots are given.

Based on all test data, it is concluded that phenolic boards protected by 1% of active pentachlorophenol will withstand 1 yr exposure under extreme conditions in contact with the ground and would probably perform satisfactorily in actual use under less extreme conditions. Under the severe exposure conditions of this test, either pehnolic board without pentachlorophenol or urea resins board with any level of toxic tested (1.25% nominal) is considered unsatisfactory. In phenolic board without pentachlorophenol, the failures are due to termite damage. Boards bonded with urea resin with or without penta, railures are due to general deterioration by termite damage (possibly through leaching and loss of pentachlorophenol, excessive swelling, mold, and resin decomposition.

Part II of this report deals with recommendations for use and general manufacturing conditions.

Fiberboard, wood, weathering, urea formaldehyde, phenolic, polymers, toxics, fungi, termite, pentachlorophenol

PDL-40378

American Society for Testing Materials, Philadelphia, Pa.
REPORT OF COMMITTEE D-7 ON WOOD
1961 Preprint 39 13 p.

Wood, standards, specifications, toxics, creosote, petroleum, water content, tests

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Wood 104
PDL-39750

Cowling, Ellis B., and Irving B. Sachs (U. S. Forest Service. Forest Products Laboratory, Madison, Wis.)
DETECTION OF BROWN ROT WITH OSMIUM TETROXIDE STAIN
Forest Products J. 10:594-596 (November 1960)

Staining with osmium tetroxide permits rapid and easy detection of either incipient or advanced brown rot. A few drops of a 1% wt/vol aqueous solution are applied with a pipette or eye-dropper to a freshly-cut surface. The time for development of a jet black color (metallic osmium) is noted as short (<5 min) or long (>20 min). Short-time blackening indicates presence of brown rot; stages of decay ranging from 2 to 70% weight loss darken with equal rapidity. The test is not applicable to detection of brown rot in heartwood of 5 softwoods and a number of hardwoods, healthy heartwood samples of these woods darken within 5 min. The test is useful, however, for both heartwood and sapwood of a wide selection of listed North American hardwoods and softwoods. Long-time blackening (> 20 min) indicates either freedom from infection or presence of white rot only.

Osmium tetroxide is highly toxic; skin contact or inhalation of fumes should be avoided.

Wood, fungi, wood rot, test, indicator

PDL-40105

Burch, Joseph E. (Battelle Memorial Institute), and R. H. Colley (Bernuth, Lembcke Co.)
A NEW METHOD FOR CHARACTERIZING MIXTURES OF CREOSOTE AND PETROLEUM OILS
Forest Products J. 11:197-200 (April 1961)

Wool, toxics, creosote, petroleum, glycol, analysis, technique

1961 Wood 105
Vol.18 PDL-37972

Alper, Norman (Chemical Research Laboratories of America, Inc.)
PAPER MANUFACTURE UNDER NEAR STERILE CONDITIONS
Tappi 43(2):181A-183A (February 1960)

Stabilized concentrated chlorine dioxide solutions (45,000 ppm) when added at a low rate (1 gal/24 hr) was effective within 3 days in various mills. Slimes disappeared and the quality of the finished product was improved. The stabilized compound does not have the drawbacks of instability, toxicity and irritating odor of gaseous chlorine dioxide. Unlike chlorine, its bactericidal properties are not materially affected by pH values between 6 and 10; it has a lower oxidation potential than hypochlorite and therefore more specific action on lignin, leaving cellulose almost unattacked.

Dilutions of chlorine dioxide as now used do not promote corrosion of the metals normally found in paper machines; they do not weaken felts, react with wet strength resins nor modify the physical characteristics of wet-strength paper products. The product has no toxic residues and does not contribute to stream pollution.

Slime, toxics, paper mills, chlorine dioxide

PDL-39925

Blomquist, Richard F. and H. O. Fleischer (U. S. Forest Service. Forest Products Laboratory, Madison, Wis.)
ADHESIVES: THEIR FUTURE IN THE WOOD INDUSTRY
Forest Products J. 10: 626-630 (December 1960)

Wood, adhesives, market, uses, review

1961 Wood 106
Vol.18 PDL-39751

Lund, Horace O. (Georgia. University)
WILL WOOD PRESERVATIVES BLOCK TERMITE TUBING?
Pest Control 29:58-60 (April 1961)

Ability of termites to build tubes over treated wood and masonry obstacles was studied. A partly eaten wooden block was mounted on a 1 x 1 x 6 in. pedestal of treated pine standing on moist soil in a darkened jar. Five hundred termites were placed on the block and allowed to crawl or drop to the soil. If the colony died out prematurely, the procedure was repeated until tubes were completed. When an Osmose-treated pedestal was placed in the jar, tubes were completed in 9 days; over aged creosote impregnate, in 12 days; fresh creosote impregnate in 19 days; 2% copper naphthenate in fuel oil in 27 days, and Wolman salts in 28 days. Pine pedestals soaked in 2% pentachlorophenol solution were not tubed over for nearly 2 yr, although termites crawled freely over treated pedestals during the first several hours of each test. Tube building over copperized chromated zinc chloride treatment took fourteen trials over 16 mo.

In a second series of similar tests, 3.5 in. long by 3.5 in. diameter cylinders of plaster of Paris and 6 in. lengths of concrete draintile were substituted for the wooden pedestals. The plaster and concrete cylinders were dipped momentarily in various concentrations of aldrin (0.0005 to 1%), dieldrin (0.00054 to 1.5%) and chlordane emulsions (0.002 to 2.0%), dried and aged. Tunnels were completed only on the plaster of Paris cylinders treated with 0.002% chlordane 7 wk after treatment. After 9 mo, no tubes had been built over even the lightest aldrin or dieldrin treatments, or the second lowest level of chlordane (0.02%).

Termites, toxics, aldrin, dieldrin, chlordan